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AT

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Bulletin of the Museum of Comparative Zoology

AT HARVARD COLLEGE

Vol. 110, No. 1

ZOOLOGICAL RESULTS OF A FIFTH EXPEDITION TO EAST AFRICA

I

MAMMALS FROM NYASALAND AND TETE.

With Notes on the Genus *Otomys*

By Barbara Lawrence and Arthur Loveridge

With Three Plates

CAMBRIDGE, MASS., U.S.A.

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I

Mammals from Nyasaland and Tete. With Notes on the Genus Otomys

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INTRODUCTION

The collection on which the following report is based, was made by Arthur Loveridge while investigating the herpetofauna of the largely deforested mountains of Nyasaland. The enquiry was jointly financed by grants from the Penrose Fund of the American Philosophical Society, and from the Museum of Comparative Zoology on whose behalf it was carried out.

A synopsis of the itinerary is given in the caption accompanying Plate 1 — a map showing the position of the principal collecting localities. Altitudes and other information regarding the various camps will be furnished in the final report of this series which will deal with the general conclusions. However, it is as well to state here that camp in the Misuku Mountains was made beside the Matipa Forest; on the Nyika Plateau directly above Nchenachena at 7500 feet; on Mlanje Mountain at three different points, viz. Lichenya Plateau, the Likabula River in the western foothills, and the Ruo Valley on the southeastern slopes. Mtimbuka (Tembuka on labels) is on the southwest shore of Lake Nyasa about fourteen miles north of Fort Johnston. The locality figuring as "near Tete, M." in the following pages, is the village of Kasumbadedza on the south bank of the Zambezi River five miles west of Tete, Mozambique.

Tete (pronounced Tet, though spelled Tette by the earlier naturalists) was made famous as a type locality by Wilhelm Peters who, with a little help from other mammalogists, described no fewer than thirty mammals from there. It was in the hope of securing topotypical material that Loveridge visited the place, first settled by the Portuguese in 1531. Topotypical material of eleven Tete mammals was collected, besides topotypes of fifteen Nyasaland species; a further twenty animals described from Nyasaland were obtained there, though not in the precise type locality. Altogether, except for a shrew taken in Kenya on the outward voyage, and about 50 alcoholics, 550 skins representing 95 forms were preserved between July 29, 1948, and April 1, 1949; of these 41 are new to our collections.

Almost a dozen erroneous or vague type localities have been amended by Moreau, Hopkins and Hayman (1946); such are indicated by a reference to Moreau et al, whose paper will be found in the bibliography. Otherwise we follow G. M. Allen (1939) who replaced obsolete geographical names like Portuguese East Africa by their modern equivalent, in this instance Mozambique. Localities where material was collected during the course of Loveridge's expedition are arranged from North to South, not listed chronologically.

The taxonomic sections of the paper are by Barbara Lawrence. The field notes included under such headings as *Native names*, *Breeding*, *Diet*, *Parasites*, *Enemies*, *Measurements*, etc. are by Arthur Loveridge.

Colors in quotation marks are after Ridgway (1912). When measurements are given serially, they are always in the following order: (1) length from snout to anus; (2) length of tail without terminal hairs; (3) length of hind foot, which, unless otherwise stated, is measured without claws; occasionally in the discussion "c.u." is used meaning with claws, and "s.u." meaning without claws; (4) length of ear from tip to notch. In the case of bats a fifth measurement is added: (5) length of wing from axilla to tip. Where cranial measurements are not standard, they are described in detail in the text; "br." means not measured because the skull was broken. All dimensions are in millimetres, and, unless otherwise stated, those given are of the largest male and largest female of the series. Subadult specimens which are insufficiently mature to display adult characters are listed as "yng".

It was found necessary to describe as new, four forms, three of which were taken in Nyasaland, though the types of two are based on Tanganyika material collected during the course of an earlier safari. These four new forms are:

Steatomys pratensis nyasae from Likabula River, Mlanje Mtn., Nyasaland.

Dasymys incomtus alleni from Ilolo, Rungwe Mtn., Tanganyika Territory.

Otomys uzungwensis from Dabaga, Uzungwe Mtns., Tanganyika Territory.

Otomys barbouri from Kaburomi, Mount Elgon, Uganda.

ACKNOWLEDGEMENTS

We take this opportunity of thanking Dr. T. S. C. Morrison-Scott and Mr. R. N. Hayman of the British Museum (N.H.) for examining certain types; Messrs. C. W. Benson and Guy Muldoon of Nyasaland for donating some skins of species we might not otherwise have got. We are grateful to our colleague Dr. J. C. Bequaert for identifying some of the ectoparasites but unfortunately it has not been possible to get all groups done; also Dr. J. T. Lucker of the United States Department of Agriculture for similar courtesies regarding parasitic worms.

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SYSTEMATIC DISCUSSION
MACROSCELIDIDAE

Rhynchocyon cirnei cirnei Peters

Rhynchocyon cirnei Peters, 1847, Ber. über Verhandl. K. Preuss. Akad. Wiss. Berlin, p. 37, pl. iv, fig. 1: Quelimane, Boror District, Mozambique.

♀ (M.C.Z. 43738) Likabula River. 5.viii.48.

Native name. Sakwi (Nyanja).

Discussion. Allen & Loveridge's (1933, p. 53) careful comparison of the pattern in this and the following form, applies very well to the specimens at hand except that in this Likabula elephant shrew the chestnut spots are darker with the buffy spots more reduced, and the third lateral line has four or five ill-defined chestnut spots. The skull is too badly broken to show any cranial differences between the two forms except for the larger teeth in *cirnei* (M^1/–M^3/ 11.2 mm. in *cirnei* 10 mm. in *hendersoni*; width of M^1/ 4 mm. and 3.8 mm. respectively).

Size. ♀. 251. 220. 66. 29 mm.

Breeding. No embryos present, but on March 11, in Cholo Mtn. forest, two nests were found. One, constructed of leaves of which many were skeletonized, was placed against a rotting log lying on the forest floor; the other, which was twice the size of a football, had been built between two logs.

Enemies. This animal had been killed for food and was subsequently eaten by the Nyanja native who supplied the name, and denied that it was ever called *sakiwimbala* as its Nyanja name has been said to be elsewhere.

Rhynchocyon cirnei hendersoni Thomas

Rhynchocyon hendersoni Thomas, 1902, Ann. Mag. Nat. Hist. (7), **10**, p. 403: Plateau west of Lake Nyasa, [i.e. Nyika Plateau], Nyasaland (Moreau et al, 1946, p. 393).

1 ♀ (M.C.Z. 43736) Misuku Mtns. 27.ix.48.
2 ♂♂, 1 ♀ (M.C.Z. 43734–5, –7) Nyika Plateau. 3–5.xi.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 43730–3) Vipya Plateau. 18.ix.48.

Native names. Namitundi (Yao); *ndamba* (Tonga); *tondo* (Ngoni).

Discussion. The specimens from the Nyika Plateau were secured

fifteen miles from the probable type locality; those from the Misuku Mtns. and Vipya Plateau match them closely.

Size. ♂ (M.C.Z. 43731), 280. 232. 67. 31 mm.; ♀ (M.C.Z. 43732), 265. 231. 61. 28 mm.

Breeding. Small embryos (preserved) were present in the ♀ obtained on September 27, but in no others.

Habits. While it was not unusual to hear these elephant shrews scratching aside the fallen leaves in search of insects, they were very timid and rarely exposed themselves. On one occasion in the Matipa Forest, however, my gunbearer, slashing a way through the undergrowth with his machete, was ascending the mountain side above me. I was some distance below him, engaged in searching beneath a log I had overturned, when an elephant shrew, doubtless disturbed by the gunbearer, came racing down the hillside so fast that the noise of its flying feet on the carpet of dead leaves made a single continuous rushing sound like that produced by a startled snake. Though the animal passed quite close to me and in full view for twenty feet, all I saw was a brown streak, the handsome cream-colored markings being quite indistinguishable.

One evening I was standing alone and unarmed in the forest when a scared shrew came rushing straight towards me. What had alarmed it I do not know, but it was within twelve feet before it caught sight of me, halted and froze. For a full minute the animal remained motionless, poised on its stiltlike legs, affording me an excellent opportunity of observing how wonderfully its blotches blended with the lights and shades of its surroundings. Then, so slowly and stealthily that no movement was obvious, it turned about and moved away six inches until hidden by some intervening stems of undergrowth, after which it bolted without further hesitation.

Petrodromus sp.

yng. ♂ (M.C.Z. 43913) Nchisi Mtn. 10.xii.48.

Native names. Sakwi zumbi (Chewa).

Discussion. This specimen is much too young for positive identification.

Size. ♂. 129. 88. 45. 27 mm.

Remarks. Taken alive in bathroom after a heavy downpour on previous day. Evidently it had entered through a water run-off hole.

Parasites. Ticks (*Ixodes* sp.) from chest preserved.

Nasilio brachyrhynchus fuscus (Peters)

Macroscelides fuscus Peters, 1852, Reise nach Mossambique, Säugeth., p. 87, pls. xix, xxii: Boror, Mozambique (Moreau et al, 1946, p. 391).

yng. ♀ (M.C.Z. 44086) Chitala River. 17.xii.48.
3 ♂♂, 5 ♀♀, 1 ? (M.C.Z. 43753–60, 44254) near Tete, M. 10–28.i.49.

Native names. *Azoro* (Nyungwe); *naliyeye* (Yao); *sakwi zumbi* (Chewa).

Discussion. In 1897 comparisons made by Thomas, Matschie and de Winton (and published by Thomas, 1897b, p. 928) led them to the conclusion that specimens from Boror, Tete and Nyika are the same form and further that Peters' *fuscus* was a synonym of *brachyrhynchus*. Since then Roberts has described five races, some of which intervene geographically between the type localities of *brachyrhynchus* and *fuscus*. It seems best, therefore, to revive Peters' name for the series at hand.

Size. ♂ (M.C.Z. 43757), 126. 115. 29. 21 mm.; ♀ (M.C.Z. 43755), 130. 125. 30. 22 mm.

Breeding. On January 10 a captive ♀ gave birth to a young one (68. 44. 23. 11 mm.) which was partially eaten during the night. On the 26th the largest ♀ held two embryos almost ready for birth, as were also two furred embryos on the 28th, of which one ♀ measured 64. 40. 21. 11 mm. All five were preserved in formaldehyde.

SORICIDAE

Suncus varilla minor Allen & Loveridge

Suncus varilla minor Allen & Loveridge, 1933, Bull. Mus. Comp. Zool., **75**, p. 57: Kitungulu, Urungu, Tanganyika Territory.

♀ (M.C.Z. 44102) Nyika Plateau. 28.x.48.

Discussion. In color, size, and dental pattern, this pigmy shrew resembles closely our type of *minor*. The former is an old animal, with remarkably worn teeth for a shrew; the latter is a young adult with teeth unworn. This difference in age may account for the longer fur and somewhat larger skull of the Nyika specimen which may also be somewhat intermediate towards typical *varilla*.

Size. ♀. 59. 32. 8. 8 mm.

Breeding. Four fetuses were preserved.

Habitat. Taken from a hole near my tent by our headman.

Sylvisorex sorella sorella (Thomas)

Myosorex (?) *sorella* Thomas, 1898, Proc. Zool. Soc. London for 1897, p. 930: Masuku Plateau [i.e. Misuku Mountains], Nyasaland.

♀ (M.C.Z. 44099) Misuku Mtns. 25.ix.48.

Discussion. The extraordinarily long tail and relatively large ears of this topotype of *sorella*, readily distinguish it externally from the other shrews of the area. The skull is too badly broken to show cranial characters.

Size. ♀. 70. 85. 13. 8 mm.

Crocidura occidentalis hera Dollman

Crocidura nyansae hera Dollman, 1915, Ann. Mag. Nat. Hist. (8), **15**, p. 571: Shiré Highlands, Blantyre District, Southern Nyasaland.

♀ (M.C.Z. 44255) Misuku Mtns. 15.x.48.
♀ (M.C.Z. 43739) Cholo Mtn. 19.iii.49.

Discussion. Although the specimen from the Misuku Mtns. is somewhat smaller and paler than the Cholo animal, there are no further differences to suggest anything but individual variation. Compared with specimens of *o. kivu* from the mountains north of Lake Nyasa, the Misuku animal is much paler and lacks the semi-aquatic pelage characteristic of *kivu*. The occurrence in the Misukus of the southern Nyasa race of *occidentalis* rather than the form found in the mountains of southern Tanganyika is interesting as in general Misuku animals tend to have northern, rather than southern, affinities.

Size. ♂ (M.C.Z. 43739), 137. 81. 19. 10 mm.

Breeding. Neither of these large shrews was pregnant.

Crocidura fumosa johnstoni Dollman

Crocidura fumosa johnstoni Dollman, 1915, Ann. Mag. Nat. Hist. (8), **15**, p. 510; and **16**, p. 372: Chiromo, Nyasaland.

♀ (M.C.Z. 44090) Nyika Plateau. 13.xi.48.
? ♀ (M.C.Z. 44100) Vipya Plateau. 18.ix.48.
♂ (M.C.Z. 44091) Chiradzulu Mtn. 28.viii.48.
1 ♂, 3 ♀ ♀ (M.C.Z. 43745–6, –50, –51) Cholo Mtn. 21.iii.49.

Native name. Sonche (Chewa; Manganja and Ngoni, but not specific).

Discussion. Externally, this race may be distinguished from *hirta*,

which occurs in the same area, by its much grayer color both dorsally and ventrally. Cranially, Dollman distinguishes the *fumosa* group from *hirta* and its allies on the basis of the size of the third unicuspid. In *fumosa*, this tooth is larger than the second unicuspid, while in *hirta*, the two are of about the same size. Certain other cranial details help to distinguish *fumosa johnstoni* from *hirta*. In *johnstoni*, the third upper molar is larger and has a well-developed V from the posterior corner of which a ridge runs to the postero-internal cusp; in *hirta* the V is lost so that the anterior part of the tooth is bladelike; both internal cusps are present but less well developed than in *johnstoni*. *C. f. johnstoni* may further be distinguished by the greater inflation of the pterygoid bone beneath and posterior to the hamular processes and the presence of a large round foramen on each side medial to the glenoid process.

Size. ♂ (M.C.Z. 43750), 90. 58. 15. 9 mm.; ♀ (M.C.Z. 43746), 95. 52. 15. 10 mm.

Remarks. The Cholo shrews formed part of a series of five brought in at sunset by a man who had obtained them rather lower down the mountain than the ridge where Loveridge personally collected the six *h. hirta*.

Crocidura beirae nyikae Dollman

Crocidura beirae nyikae Dollman, 1915, Ann. Mag. Nat. Hist. (8), **15**, p. 512; and **16**, p. 70: Nyika Plateau, Northern Nyasaland.

♂ ♀ (M.C.Z. 44092–3) Misuku Mtns. 23.ix–15.x.48.

Native name. Nungu (Misuku, applied to all shrews).

Discussion. No topotypes of this form were caught on the Nyika Plateau although three other species were found there. Dollman's good description of *beirae nyikae* fits the specimens at hand in every detail.

Crocidura hirta hirta Peters

Crocidura hirta Peters, 1852, Reise nach Mossambique, Säugeth., p. 78, pl. xviii, fig. 2: Tete, Mozambique.

♂ (M.C.Z. 44256) Mtimbuka. 9.ii.49.
3 ♂♂, 4 ♀♀ (M.C.Z. 43740–4, –47, –48) Cholo Mtn. 18–21.iii.49.
♀ (M.C.Z. 44088) Boroma, near Tete, M. 25.i.49.

Native names. Katolo (Yao); *sonche* (Manganja); *tsutsutsu* (Nyungwe).

Discussion. The Cholo Mountain series matches well the near topotype from the vicinity of Tete, which is also the type locality for *canescens* Peters and *annellata* Peters, which are synonyms.

Size. ♂ (M.C.Z. 43742), 104. 57. 14. 11 mm.; ♀ (M.C.Z. 43743), 98. 53. 15. 9 mm.

Habitat. The Mtimbuka shrew was hiding beneath a bundle of thatching grass leaning against a baobab, up which it ran; several of the Cholo animals were under a great pile of rotting grass; the Boroma specimen was found at the base of a stand of bananas.

Crocidura hirta suahelae Heller

Crocidura suahelae Heller, 1912, Smithsonian Misc. Coll., **60**, no. 12, p. 4: Mazeras, Kenya Colony.

♀ (M.C.Z. 44087) Changamwe, near Mombasa, K.C. 5.vii.48.

Discussion. This single specimen from near the type locality of *suahelae* is tentatively identified as that form on the basis of its slightly larger size and heavier unicuspids as compared with a series of *relutina* from Tanga. These differences are at best but small and on the basis of color alone the two are indistinguishable.

Size. ♀. 100. 35. 15. 13 mm.

Breeding. Four fetuses were preserved.

Crocidura hildegardeae hildegardeae Thomas

Crocidura hildegardeae Thomas, 1904, Ann. Mag. Nat. Hist. (7), **14**, p 240: Fort Hall, Kenya Colony.

1 ♂, 2 ♀ ♀ (M.C.Z. 44089, –94, –95) Nyika Plateau. 12–15.xi.48.
♂ (M.C.Z. 44101) Vipya Plateau. 18.ix.48.
♀ (M.C.Z. 44096) Nchisi Mtn. 9.xii.48.
♂ (M.C.Z. 44098) Lichenya Plateau. 14.vii.48.

Native name. Sonchi (Chewa; Ngoni).

Discussion. None of this scattering of examples from the whole length of Nyasaland differs in any significant way from the typical form. Apparently, as previous authors have pointed out, typical *hildegardeae* is a widespread and common race. The flattening of the skull, used by Dollman (1915b, p. 515) as a key character to separate this group from *jacksoni* and its relatives, is not a consistently good character in our series; otherwise the specimens fit well into his grouping.

Size. ♂ (M.C.Z. 44095), 74. 54. 12. 10 mm.; ♀ (M.C.Z. 44094), 71. 48. 12. 12 mm.

Breeding. On September 9, and November 16, each of two ♀ ♀ held four fetuses (preserved). It was noted that the four nipples were arranged in a chevron-shaped formation.

Diet. Shrews on the Nyika, probably assisted by *Lophuromys*, were a nuisance, nightly destroying at least two of our trapped rodents.

Enemies. A shrew, presumably this species, was recovered from the stomach of a Hissing Sand-snake (*Psammophis s. sibilans*) at Nchenachena on 19.xi.48. Its skull, together with another from Nchisi and one from Mlanje, were preserved in addition to those accompanying the skins listed above.

Habitat. The Nchisi ♀, together with a companion which escaped, was found beneath dead leaves that had drifted between the buttress roots of a giant tree in the heart of the forest.

PTEROPIDAE

Eidolon helvum helvum Kerr

Vespertilio, vampyrus helvus Kerr, 1792, in Linné, Animal Kingdom, **1**, pt. 1, pp. xvii, 91: No locality.

♂ (M.C.Z. 43761) Ruo R., Mlanje Mtn. 1.iv.49.

Size. ♂. 193. 18. 33. 30. 350 mm.

Remarks. Brought in by native. This eastern fruit bat was already recorded from Nyasaland.

Rousettus leachii (Smith)

Pteropus leachii A. Smith, 1829, Zool. Journ., **4**, p. 433: "Gardens about Cape Town," South Africa.

♂ (M.C.Z. 43833) Likabula River. 3.viii.48.

Native name. Karuru (Chewa).

Size. ♂. 155. 24. 23. 20. 310 mm.

Epomophorus ?crypturus (Peters)

Epomophorus crypturus Peters, 1852, Reise nach Mossambique, Säugeth., p. 26, pl. v; pl. xiii, figs. 1–6: Tete, Mozambique.

♀ (M.C.Z. 43762) Ruo R., Mlanje Mtn. 1.iv.49.

Native name. Mleme (Nyanja).

Discussion. It is possible that this is really *E. wahlbergi* which closely resembles *crypturus* and often occurs with it. As the palatal ridges are gone and the wing structure is difficult to see in this dried skin, we have relied for identification on the faintly grayish patches on the throat and belly. These pale spots are said never to occur in *wahlbergi* and only occasionally in *crypturus*.

Size. ♀. 132. 0. 18. 24. 260 mm.

Epomophorus labiatus minor Dobson

Epomophorus minor Dobson, 1880, Proc. Zool. Soc. London for 1879, p. 715: Zanzibar.

♂ (M.C.Z. 43763) Kausi, L. Malombe. 25.ii.49.

Native name. Lichinji (Yao, but applied to all large bats).

Discussion. This is the first record of *minor* from Nyasaland and constitutes an interesting southern extension of its known range.

Size. ♂. 112. 0. 14. 17. 205 mm.

Habitat. Found hanging in a large clump of bananas.

EMBALLONURIDAE

Taphozous mauritianus mauritianus Geoffroy

Taphozous mauritianus E. Geoffroy, 1818, Description de l'Egypte, **2**, p. 127: Mauritius Island.

♂ (M.C.Z. 43769) near Tete, M. 15.i.49.

Size. ♂. 90. 20. 8. 20. 200 mm.

NYCTERIDAE

Nycteris aethiopica oriana Kershaw

Nycteris oriana Kershaw, 1922, Ann. Mag. Nat. Hist. (9), **10**, p. 179: Chiromo, Shire Valley, Nyasaland.

♂ (M.C.Z. 43834) Chitala River. 21.xii.48.

Discussion. We have followed Allen & Loveridge (1942, p. 161) in considering *oriana* to be only subspecifically distinct from *aethiopica*. Externally, except for its shorter fur, the Chitala animal matches closely Kershaw's description of *oriana*. The large teeth ($C^1/ - M^3/$ 7.8 mm. in our specimen) are also characteristic of this form, but our bat differs from the type in having $P/_3$ only partly crowded out of line so that $P/_4$ and $M/_1$ are separated by a distinct, though small, space.

As the skull is badly broken, other cranial characters are hard to see, although the interorbital shield appears to have been broad as in *oriana*.

Remarks. Struck down when flying around the lighted lounge of Mr. W. T. Miller's house at the Cotton Growers' Experimental Station, Salima District.

Nycteris capensis Smith

Nycteris capensis A. Smith, 1829, Zool. Journ., **4**, p. 434: Interior of South Africa.

♂ (M.C.Z. 43767) Mtimbuka. 28.ii.49.

Native name. *Liputiputi* (Yao, but applied to all small bats).

Discussion. This young adult ♂, although somewhat grayer than is typical, undoubtedly belongs to this form of which Kershaw (1922, p. 178) reports ten specimens from Chiromo.

Size. ♂. 52. 57. 11. 33. 135 mm.

RHINOLOPHIDAE

Rhinolophus hildebrandtii hildebrandtii Peters

Rhinolophus hildebrandtii Peters, 1878, Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 195, pl. i, figs. 1–1a: Ndi, Taita, Kenya Colony.

3 ♀ ♀ (M.C.Z. 43764–6) Mtimbuka. 16.ii.–4.iii.49.

Native name. *Lichinji* (Yao, but applied to all largish bats).

Discussion. These three horseshoe bats, all taken in the same place, show considerable variation. The youngest, with a forearm measurement of 59 mm. as against 62 mm. in the others, has the longest tooth row, 10 mm. as against 9.5 and 9.6 mm. Further, the nasal swellings in this young adult are conspicuously higher and broader than in the other two. In color the three specimens vary from smokey brown in the youngest, to reddish brown in the oldest animal.

Size. ♀. 78. 35. 15. 33. 190 mm.

Rhinolophus empusa Andersen

Rhinolophus empusa K. Andersen, 1904, Ann. Mag. Nat. Hist. (7), **14**, p. 378: Zomba, Nyasaland.

♂ (M.C.Z. 43782) Cholo Mtn. 18.iii.49.

Discussion. This interesting little bat matches perfectly Andersen's careful description except that the tip of the tail does not project beyond the edge of the interfemoral membrane.

Size. ♂. 50. 25. 6. 18. 140 mm.

HIPPOSIDERIDAE

Hipposideros caffer caffer (Sundevall)

Rhinolophus caffer Sundevall, 1846, Öfversigt af Kongl. Svenska Vet.-Akad. Förhandl. (Stockholm), **3**, no. 4, p. 118: near Port Natal.

Phyllorhina gracilis Peters, 1852, Reise nach Mossambique, Säugeth., p. 36, pl. vii, figs. 1–4; pl. xiii, figs. 14–15: Tete, Mozambique.

3 ♀ ♀ (M.C.Z. 43776–8) Mtimbuka. 18.ii.–4.iii.49.
♂ (M.C.Z. 43774) near Tete, M. 20.i.49.

Native name. Kalemawalema (Nyungwe, but not specific).

Discussion. All are in the gray phase; dorsally the dark bases of the tricolored fur are much reduced.

Size. ♂ (M.C.Z. 43774), 50. 30. 5. 16. 130 mm.; ♀ (M.C.Z. 43776), 55. 30. 7. 13. 140 mm.

Parasites. Two yellow-orange eggs were present on the right forewing of one Mtimbuka bat and a nycteribid was preserved from the fur of another.

Habits. All three ♀ ♀ were netted as they flew to and fro on the veranda in front of a lighted window.

Hipposideros ruber (Noack)

Phyllorhina rubra Noack, 1893, Zool. Jahrb., Syst., **7**, p. 586, pl. xviii, figs. 14–15: "Lugerrunjere Fluss," Tanganyika Territory (= Ngerengere River, probably near Ngerengere Village, 32 miles east of Morogoro on the old Bagamoyo–Tabora caravan route. See Swynnerton, 1945, p. 69).

♀ (M.C.Z. 43779) Mtimbuka. 15.ii.49.

Discussion. Externally this specimen differs from the examples of *caffer*, taken at the same place, by its larger feet, longer forearm and, dorsally, the longer dark bases of the tricolor fur. Cranially the much larger skull of *ruber* readily distinguishes the two.

Size. ♀. 52. 34. 7. 14. 150 mm.

Habits. Netted under same circumstances as *caffer*.

VESPERTILIONIDAE

Pipistrellus nanus nanus (Peters)

Vespertilio nanus Peters, 1852, Reise nach Mossambique, Säugeth., p. 63, pl. xvi, fig. 2: Inhambane, Mozambique.

6 ♀ ♀ (M.C.Z. 43841–6) Misuku Mtns. 25.ix.48.
2 ♂ ♂ (M.C.Z. 43775, 43780) Mtimbuka. 25.ii.–1.iii.49.
1 ♂, 5 ♀ ♀ (M.C.Z. 43835–40) Zomba Plateau. 3.ix.48.
♂ (M.C.Z. 43781) Cholo Mtn. 21.iii.49.
2 ♂ ♂, 3 ♀ ♀ (M.C.Z. 43847–51) Likabula R. 29.vii.48.

Native names. Chuchu (Manganja); *kashusha* (Misuku); *ndemia* (Chewa); *liputiputi* (Yao, but applied to all small bats).

Discussion. Specimens from southern Nyasaland undoubtedly approach Peters' animal very closely, averaging slightly paler than examples from the Misukus and mountains to the north of Lake Nyasa; these in turn average paler than Kenya specimens. East African banana bats are usually all referred to typical *nanus* and by far the greatest number of individuals are indistinguishable from one another. However, the darkest of the Kenya bats are darker with more coppery brown tips to their fur than any of the southern Nyasaland animals, and the palest of the latter are paler with more yellowish brown tips to the fur than any of the Kenya specimens.

Size. ♂ (M.C.Z. 43847), 43. 35. 5. 11. 98 mm.; ♀ (M.C.Z. 43839), 44. 40. 5. 11. 104 mm.

Breeding. On September 25, two ♀ ♀ each held two embryos.

Habits. At Mtimbuka, netted while flying with *Nycteris* and *Hipposideros* to and fro along a veranda in front of a lighted window.

Scotophilus nigrita dingaanii (Smith)

Vespertilio Dingaanii A. Smith, 1833, S. Afr. Quart. Journ., **2**, p. 59: (60 miles east of Natal, *fide* A. Smith, 1836, Illus. Zool. S. Afr.).

♂ (M.C.Z. 43768) Fort Johnston. 16.ii.49.

Discussion. We have followed Thomas & Wroughton (1908, p. 538) and Kershaw (1922, p. 182) in considering *Nycticejus planirostris* Peters, 1852, from Tete, to be synonymous with *dingaanii*.

Size. ♂. 85. 56. 10. 17. 180 mm.

MOLOSSIDAE

Chaerephon limbatus (Peters)

Dysopes limbatus Peters, 1852, Reise nach Mossambique, Säugeth., p. 56, pl. xiv: Mozambique Island (restricted by Moreau et al, 1946, p. 400).

3 ♂♂, 7 ♀♀, 1 ? (M.C.Z. 42852–62) Chitala R. 14.xii.48.
1 ♂, 3 ♀♀ (M.C.Z. 43770–3) near Tete, M. 25.i.49.

Native name. *Kalemawalema* (Nyungwe, but not specific).

Discussion. Peters' description was based on specimens from Sena, which is not far from Tete, as well as on examples from Mozambique Island. The form appears to be widespread and fairly uniform. Cranially as well as in external dimensions, our Tete bats are indistinguishable from those in the Chitala series. In color the extremes of the Chitala series have the tips of the dorsal fur slightly browner than in the Tete animals.

Size. ♂ (M.C.Z. 43860), 60. 37. 8. 18. 130 mm.; ♀ (M.C.Z. 43770), 63. 35. 7. 17. 123 mm.

Breeding. Two of the three Tete ♀♀ held large embryos (preserved) almost ready for parturition.

Trapping. At Chitala River, in addition to the 11 skins listed above, 27 bats were preserved in alcohol. These were obtained by means of a simple type of trap that was being employed about the buildings of the Empire Cotton Growers' Association to rid them of free-tailed bats, the stench of whose guano is liable to render houses uninhabitable. At one house, I was told, 44 bats were captured the first night and a total of 140 in the three weeks that it took to clear the place.

The effectiveness of the trap is based on the known fact that these animals cannot take to the air without a certain amount of leeway in which to spread their wings. All that one requires is a long triple-forked pole and a five-gallon gasoline can. From the latter a side must be cut away, and with this open side uppermost the can is inserted in the fork of the pole. The pole is then raised and wedged against the guttering, or eaves, of a building immediately below the aperture from which the bats have been observed to emerge at sundown. As they leave the building the bats launch themselves into the receptacle up whose slippery sides they cannot climb. At the Experimental Station it was routine practice to set up these traps around any building where the animals were becoming obnoxious.

CANIDAE

Thos adustus adustus (Sundevall)

Canis adustus Sundevall, 1846, Öfversigt af Kongl. Svenska Vet.-Akad. Förhandl. (Stockholm), **3**, no. 4, p. 121: In Caffraria interiore.

1 yng. ♂, 2 yng. ♀ ♀ (M.C.Z. 44157–9) Misuku Mtns. 27.ix & 5.x.48.
♂, ♀ (M.C.Z. 44289–90) Nyika Plateau. 9–10.xi.48.

Native names. *Ukambwe* (Misuku); *kandwe* (Nyungwe).

Discussion. The two adults clearly belong to the typical form rather than to the more northern white-bellied race *notatus* which has been recorded from Tanganyika Territory. The three young are not old enough for positive identification although they probably should be attributed to this species.

Size. ♂. 800. 360. 165. 90 mm.; ♀. 840. 370. 157. 88 mm.; the ♂ and ♀ cubs were from the same litter and both measured 300. 125. 65. 36 mm.

Diet. Fur of a blesmol (*Heliophobius a. angonicus*) present in stomach of one Nyika jackal. The pups were ravenous, taking milk, bread-and-milk, boiled rice in milk, and finally raw minced meat. They had to be fed every four hours until midnight, after which they would sleep until roused by the predawn hooting of an owl or the shrill squeaking of homing bats. Eventually they were chloroformed.

Parasites. A tick (*Haemaphysalis leachi*) was preserved from the Nyika ♀.

MUSTELIDAE

Aonyx capensis capensis (Schinz)

Lutra capensis Schinz, 1821, in Cuvier, Thierreich, **1**, p. 214: Cape Colony.

Skin only (M.C.Z. 44288) Nswadzi River, Cholo District.

Remarks. Bought from a native on 18.iii.49.

VIVERRIDAE

Civettictis civetta schwarzi Cabrera

Civettictis civetta schwarzi Cabrera, 1929, Mem. Real Soc. Espãnola Hist. Nat. Madrid, **16**, p. 36: Zanzibar (selected by Schwarz, 1934).

Skin only (M.C.Z. 44287) Degwe, *ca.* 10 miles S.W. of Tete, M.

Native names. *Sere* (Nyungwe); *ungo* (Yao).

Remarks. Purchased from a native on 24.i.49.

Genetta tigrina mossambica Matschie

Genetta mossambica Matschie, 1902, Ver. d. V. Internat. Congress (Berlin, 1901), p. 1138: Mossimboa, Mozambique (restricted by Moreau et al, 1946, p. 409).

1 ♂, 1 yng. ♂ (M.C.Z. 44280–1) Mtimbuka. 9–14.ii.49.
♂ (M.C.Z. 44282) near Tete, M. 26.i.49.

Native names. *Mwili* (Nyungwe); *ndendu* (Yao).

Discussion. The great individual variation in coat color found in the species *tigrina*, has been described in some detail for the race *stuhlmanni* (Allen & Lawrence, 1936, p. 61). These adults of *mossambica* show a similar, though less extreme, variation, with the older individual from Tete being considerably paler than the young adult from near Fort Johnston. Both agree in differing from *stuhlmanni* in the slightly paler color of the cheeks and insides of the thighs, and in the sprinkling of white-tipped hairs ventrally on the black rings and tip of the tail. Cranially, *mossambica* is distinguished by its large skull with longer tooth rows and bigger individual teeth, particularly premolars.

Size. ♂ (M.C.Z. 44280), 550. 510. 95. 54 mm.; ♂ juv., 225. 190. 50. 33 mm.

Diet. The stomach of the Tete genet held the remains of a rare burrowing snake (*Prosymna lineata*), a large yellow scorpion (*Buthus trilineatus*) and some orthoptera. That of the Mtimbuka adult was *full* of flesh taken from the carcass of a baboon tethered outside my window.

Parasites. The kitten was swarming with larval ticks (*Haemaphysalis leachi*), some from the tail of the Mtimbuka ♂ were also preserved. The feces of the Tete genet, defecated after death, were alive with small cestodes which were preserved.

Habitat. The Tete genet was shot about 7:00 A.M. on a cloudy morning as it lay curled up beside a hole high on the trunk of a great baobab. The Mtimbuka specimen was obtained about midnight when I shone its eyes in the top of a tall acacia where I was looking for galagos.

Nandinia binotata gerrardi Thomas

Nandinia gerrardi Thomas, 1893, Ann. Mag. Nat. Hist. (6), **12**, p. 205: Lower Shiré River, Nyasaland.

Remarks. Two skins, taken in the Matipa Forest, Misuku Mountains, were shown to Loveridge by an old man on 24.ix.48. The record links that of the type locality with those from Rungwe and the Ukinga Mountains recorded as *arborea* (Allen & Loveridge, 1933, p. 75).

Native name. Njule. (Misuku).

Myonax cauui cauui (Smith)

Ichneumon cauui A. Smith, 1836, Report Exped. for Exploring Central Africa, app., p. 42: Kurrichane, northwestern Transvaal.

♀ (M.C.Z. 44138) Misuku Mtns. 7.x.48.

Native name. Kasera (Misuku).

Discussion. Myonax c. cauui, of which *ornatus* Peters from Tete is a synonym, is a widespread and rather variable form. The species is chiefly South African so that the occurrence of the typical form in the extreme north of Nyasaland is of particular interest. Of the various races described by Roberts, the one closest geographically to the Misuku Mtns. is *lancasteri*, from which our specimen differs in having the chestnut patch restricted to the head and nape instead of extending in a broad band to the base of the tail as well as having the annulated hairs of the back extend less far down on the sides. Compared with the *sanguineus* group, *cauui* may readily be distinguished by its smaller size and chestnut cap.

Size. ♀. 270. 210. 47. 26 mm.

Diet. Stomach held the remains of a grasshopper and what was apparently a mouse.

Parasites. Nematodes (*Travassospiura dentata*) present in stomach.

Enemies. The body was eaten by Zacheyo, our Ngoni wood and water man.

Myonax ratlamuchi auratus (Thomas & Wroughton)

Mungos auratus Thomas & Wroughton, 1908, Proc. Zool. Soc. London, p. 543: Tete, Mozambique.

♀ (M.C.Z. 44153) near Tete, M. 14.i.49.

Native name. Linkoli (Nyungwe).

Discussion. Both externally and cranially this topotype matches closely Thomas and Wroughton's description.

Size. ♀. 340. 280. 61. 25 mm.

Remarks. No fetuses; stomach empty; brought in by native boy.

Myonax sanguineus zombae (Wroughton)

Mungos melanurus zombae Wroughton, 1907, Ann. Mag. Nat. Hist. (7), **20**, p. 115: Zomba, Nyasaland.

♂ (M.C.Z. 44139) Cholo Mtn. 14.iii.49.

Native name. *Nyenga* (Yao, for one seen crossing the road at Mtimbuka).

Discussion. Except for its slightly larger size, both cranially and externally, this Cholo animal matches closely Wroughton's rather brief description. The strong resemblance between this specimen and the more northern races of *sanguineus*, including particularly the reddish form *rufescens* (Lorenz) from Zanzibar, reinforces G. M. Allen's opinion (1939, p. 225) that the *melanurus* group is not more than subspecifically distinct from the *sanguineus* group.

Size. ♂. 320. 260. 57. 26 mm.

Rhynchogale sp.

Skin only (M.C.Z. 44316) Mwera Hill, near Nchisi Mtn.

Discussion. Unfortunately the skull of this interesting specimen is missing so positive identification is difficult. In general color it looks much like a small, white-tailed *Ichneumia albicauda* but in details of nose and feet it differs conspicuously. The combination of no naked groove across the hairy upper lip below the rhinarium and five toes on both fore and hind feet ally it to *Rhynchogale* of which both known forms have dark tails. This feature, being variable in races of *Ichneumia*, may also vary in this little known genus. The broad, rather heavy feet and hairy heels of the specimen at hand are like those of *Bdeogale* from which it differs in the number of toes. Of these the first front toe, though small, is readily apparent, the first hind toe is minute.

Mr. R. W. Hayman has kindly compared the skin with specimens in the British Museum and agrees that it is very likely a *Rhynchogale*, stating further, "it is of course, in its white tail and smaller size, quite unlike *R. melleri*,... It agrees fairly well in colour and character of body hair with *R. caniceps* Kershaw, but is smaller than the type and only specimen we have of that, and *caniceps* again has a blackish tail like *melleri*."

FELIDAE

Caracal caracal limpopoensis (Roberts)

Lynx caracal limpopoensis Roberts, 1926, Ann. Transvaal Mus., **11**, p. 248: Njellele River, north of Zoutpansberg, near Limpopo River, northern Transvaal.

Skin only (M.C.Z. 44286) Katumbi area.

Discussion. This native skin without skull agrees with Roberts' description in being paler than typical *caracal* and in displaying a conspicuous stripe of dark-tipped hairs down the dorsal surface of the tail.

Remarks. This skin from Katumbi, Nyasaland, near the Nyasaland-Northern Rhodesia border, was purchased in April, 1947, by Mr. C. W. Benson who kindly presented it to the Museum. The record is of particular interest on account of the oft-repeated statement made by Sir Harry Johnston (1897, p. 285) that the lynx does not occur in Nyasaland.

Felis serval beirae Wroughton

Felis capensis beirae Wroughton, 1910, Ann. Mag. Nat. Hist. (8), **5**, p. 206: Beira, Mozambique.

Skin only (M.C.Z. 44284) Malala, west of Tete, M.

Native name. Chombwe (Nyungwe).

Discussion. Compared with Wroughton's description of the type, this skin agrees in color and in the manner in which the dorsal stripes are broken up. It differs in having the lateral spots somewhat larger and more elongated.

Felis lybica mellandi Schwann

Felis ocreata mellandi Schwann, 1904, Ann. Mag. Nat. Hist. (7), **13**, p. 423: Mpika, northeastern Rhodesia.

♀ (M.C.Z. 44285) Nchisi Mtn. 26.xi.48.

Native name. Vumbwi (Chewa).

Discussion. Pocock (1944, p. 131) notes that Schwann's original description is misleading and redescribes the type as follows: "upper side . . . dark grey, owing to the black and white speckling of the contour hairs; the blackened spinal area has dull buff speckling; the lower side is ochraceous buff diluted by the long whitish tips to the

hairs; the ears and nose are mainly rusty ochreous and the cheeks are buff, contrasted with the white chin." He adds that the forelegs are distinctly and normally striped. Our specimen from Nchisi agrees closely with this account; the rather pale color and sharply contrasting rusty ochreous ears are its most conspicuous feature.

Size. ♀. 575. 320. 132. 62 mm.

Parasites. One nymphal tick preserved.

Habitat. Shot on road about midnight.

Felis pardus ?pardus Linné

Felis Pardus Linné, 1758, Syst. Nat., ed. 10, **1**, p. 41: "In Indiis," but designated by Thomas (1911) as Egypt.

Skull only (M.C.Z. 44283) Chiradzulu Mtn. 26.viii.48.

Native names. Kimbwe (Misuku); *kizui* (Yao); *nyarubwe* (Chewa).

Discussion. Pocock (1932, p. 590) synonymizes the East African leopard *suahelica* with *p. fusca*, the Bengal leopard, and includes Nyasaland in its range. However, as pointed out by Allen & Loveridge (1933, p. 81), the range of typical *pardus* intervenes between the ranges of the East African and Indian forms. It seems best, therefore, to refer the Nyasaland form to *pardus* until further evidence is forthcoming to establish *suahelica* as a distinct race.

Remarks. This skull was prepared from the head of a halfgrown leopard found lying on the path near the summit of the mountain. Mr. W. H. J. Rangeley thought that the animal had been bitten in the neck and killed by an older leopard. Leopards are still numerous in Nyasaland and were either heard, disturbed, or signs of them encountered, at almost every camp made during the nine months.

LORISIDAE

Galago crassicaudatus crassicaudatus Geoffroy

Galago crassicaudatus E. Geoffroy, 1812, Ann. Mus. d'Hist. Nat. (Paris), **19**, p. 166: No locality given, but fixed by Thomas (1917) as Quelimane, Mozambique.

2 ♀♀ (M.C.Z. 44135–6) Mtimbuka. 9–10.ii.49.

Native name. Likomba (Yao).

Discussion. These are clearly typical *crassicaudatus*, although they differ from Schwarz's (1931, p. 44) description of this form in having the hands darker than the arms.

Size. ♀. 320. 400. 35. 68 mm.

Breeding. No sign of a fetus in either animal.

Remarks. The extremely raucous call of this species seemed quite unlike my recollections of the cry of *G. c. panganiensis.* Disturbed by their noisy cries I went outside at 11.40 P.M. and shone the eyes of a pair of galagos in the top of an acacia in the garden. Another night two were located in an *Hyphaene* palm, where they probably spent the day.

Galago senegalensis nyasae Elliot

Galago nyasae Elliot, 1907, Ann. Mag. Nat. Hist. (7), **20**, p. 188: Mountains south of Lake Nyasa, Central Africa (Moreau et al, 1946, p. 401).

♂ (M.C.Z. 44134) Cholo Mtn. 21.iii.49.

Discussion. Based on an examination of the type only, Schwarz (1931, p. 56) synonymized *nyasae* with *moholi*, extending the range of the latter as far north as Tabora District, Tanganyika Territory. The specimen at hand differs markedly from our series of *moholi*. Compared with three individuals from Tete, *nyasae* is larger both externally and cranially, very much browner dorsally and on the tail, and "cinnamon-buff" rather than "ivory" ventrally. Cranially, the proportionally longer rostrum, more projecting premaxillaries, and larger teeth all distinguish *nyasae* from *moholi*. The distinctness of these two races is further confirmed by Loveridge's re-examination of the types and other material in the British Museum. Actually *nyasae* resembles *zanzibaricus* (a form that is intermediate towards *demidovii*) more closely than it does *moholi*. There is no size difference between the two, either externally or cranially; the slightly projecting premaxillaries found in *nyasae* are also characteristic of *zanzibaricus* (cf. Lawrence & Washburn, 1936, p. 256), while in relative size of M^3/ and incipient development of a cingulum on this tooth *nyasae* approaches the *demidovii* group even more closely than does typical *zanzibaricus*. In color, *nyasae* differs in being slightly more pinkish brown dorsally and pinkish buff ventrally, while specimens of *zanzibaricus* from Tanga and the Uluguru Mountains are more yellowish.

Size. ♂. 170. 215. 60. 38 mm.

Galago senegalensis moholi Smith

Galago moholi A. Smith, 1836, Report Exped. for Exploring Central Africa, app., p. 42: Banks of Marikwa and Limpopo, Bechuanaland.

O(tolicnus) mossambicus Peters, 1876, Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 473, footnote: Tete, Mozambique.

1 ♂, 2 ♀ ♀ (M.C.Z. 44131–3) near Tete, M. 15–17.i.49.

Native name. *Kamundi* (Nyungwe).

Discussion. These specimens are topotypes of *O. mossambicus*, a form which Schwarz (1931, p. 56) and subsequent authors have considered synonymous with *moholi*. All three agree in being grayer with less ochraceous on the hind legs than in two specimens of *moholi* from Bechuanaland and Vaalwater, Transvaal, while a comparison of skulls of the same age shows the Tete animals to be slightly smaller than the more southern individuals. The differences are slight, and in a variable species, insufficient to warrant subspecific distinction and the consequent reviving of Peters' name.

Size. ♂. 145. 240. 53. 40 mm.; ♀. 145. 220. 57. 39 mm.

Breeding. Two embryos were present in the ♀ shot on January 15 when she peered from a hole in a baobab tree which she shared with the ♂.

CERCOPITHECIDAE

Cercopithecus mitis moloneyi Sclater

Cercopithecus moloneyi P. L. Sclater, 1893, Proc. Zool. Soc. London, p. 252: near Karonga, Lake Nyasa, Nyasaland (Moreau et al, 1946, p. 403).

1 ♂, 4 ♀ ♀, 1 yng., ♂ fetus (M.C.Z. 44264–70) Misuku Mtns. 23.ix–4.x.48.

Also heard on slopes of Nyika at 5000 ft. (13.xi.48).

Native names. *Lichilu* or *lichiru* (Yao); *mbisa* (Misuku).

Discussion. The Matipa Forest, where this series was obtained, is not far from the type locality, and specimens from there resemble closely our series of *moloneyi* taken previously in the mountains north of Lake Nyasa. Compared with the southern race, *nyasae*, *moloneyi* is a far more strikingly colored animal. The back behind the shoulders is "orange rufous" to "Sanfords brown" with the black rings on the hairs often inconspicuous. The fore limbs are entirely black, the long black hairs forming a handsome mantle on the shoulders. The head, instead of being evenly speckled, has the grayer cheeks marked off from the yellower top of the head by conspicuous black patches formed by the longer dark tips of the hairs in this region.

Size. ♂. 600. 700. 155. 39 mm.; ♀. 555. 690. 135. 35 mm.

Breeding. On October 4 a fetal ♂ measured 190. 265. 66. 25 mm. One infant, being carried by its mother in customary fashion, had its tail entwined around hers, something I (A.L.) do not recall having

seen before. Also at this season a considerable company of young monkeys, in charge of a few older animals (? subadult females), were much in evidence.

Cercopithecus mitis nyasae Schwarz

Cercopithecus leucampyx nyasae Schwarz, 1928, Ann. Mag. Nat. Hist. (10), **1**, p. 656, footnote: Fort Lister, Mlanje Mtn., southern Nyasaland.

♀ (M.C.Z. 44275) Lichenya Plateau. 14.viii.48.
1 ♂, 3 ♀ ♀ (M.C.Z. 44271–4) Cholo Mtn. 14–19.iii.49.

Seen also on the southern spur of Chiradzulu Mtn.

Native names. *Nchima* (Chewa); *Mchima* or *ncima* (Nyanja).

Discussion. The specimen from Lichenya Plateau is practically topotypic of *nyasae* and matches closely the four from Cholo Mountain. The markings in this race are not nearly as bright or as contrasting as in *moloneyi*. The yellowish rings on the hairs of the back are near "yellow ocher", this suffusion being most intense on the lower back. The top of the head and cheeks are rather evenly speckled, the pale rings being about "cream buff" on the top of the head and fading gradually into the grayer cheeks. The insides of the forelimbs are speckled with grayish as are the shoulders and hindlimbs while the hands, feet and outsides of the forelimbs are black. In all of the specimens, contrasting with the yellowish back, there is a trace of "orange rufous" on the tips of a very few of the hairs around the ischial callosities. A similar but more conspicuous patch is found in specimens of *nyasae* from Chirinda Mountain, Southern Rhodesia.

Size. ♂. 720. 915. 165. 43 mm.; ♀ (M.C.Z. 44274), 540. 740. 147. 45 mm.

Breeding. None held a fetus.

Diet. Stomachs were distended with finely masticated green leaves.

Enemies. Within a few days of our arrival at Likabula River, two of these monkeys were brought me by a native hunter. I did not acquire them as the man was asking ten shillings each for them, being valued for their meat. All the animals I shot were eaten.

Habits. As these handsome monkeys are much harassed by the natives they usually keep to the closed forests where they are more often heard than seen. When anyone approaches they promptly conceal themselves in the dense mass of epiphytic growth that smothers so many of the trees. An exception was provided by the old male shot below my Cholo camp in an isolated tree that it must have reached by coming through a hundred yards of standing maize corn. Almost

the entire body of this monkey was covered with a thick layer of yellow fat. In its tail were two long gashes, presumably made by the canines of another male; the cuts held minute maggots.

Cercopithecus aethiops rufoviridis Geoffroy

Cercopithecus rufo-viridis I. Geoffroy, 1842, Comptes Rend. Acad. Sci. Paris, **15**, p. 1038: Africa.

♂, ♀, yng. ♂ (M.C.Z. 44261–3) Mtimbuka. 23–28.ii.49.

Native name. *Kitumbili* (Yao).

Discussion. We have followed Schwarz (1926, p. 38) in calling the Nyasaland form *rufoviridis*.

Size. ♂. 540. 690. 150. 42 mm.; ♀. 440. 565. 118. 40 mm.; juv. ♂. 240. 330. 77. 33 mm.

Papio cynocephalus strepitus Elliot

Papio strepitus Elliot, 1907, Ann. Mag. Nat. Hist. (7), **20**, p. 194: Fort Johnston, south end of Lake Nyasa, Nyasaland.

yng. ♂ (M.C.Z. 44278) Mwaulambo, Misuku Mtns. 29.ix.48.
2 ♂♂ (M.C.Z. 44276–7) Mtimbuka. 8–22.ii.49.

Seen also at Likabula River (5.viii); Dedza (14.viii); Nchisi Mtn. (26.xi); and Blantyre-Tete road near Zambezi (3.i.49).

Native names. *Kolwe* (Misuku); *lijani* (Yao); *mkwere* (Chewa).

Discussion. The two from Mtimbuka are near topotypes of *strepitus* and differ very little from a specimen of *cynocephalus* from Kilosa, Tanganyika Territory. In the former, the outside of the limbs and top of the head are slightly more reddish, while the inside of the limbs and the hairs at the bases of the toes are silvery instead of reddish buffy. The tip of the tail in both Mtimbuka animals is pale, whereas in *cynocephalus* it is dark. The chief cranial difference lies in the proportion of rostrum to brain case. In our *strepitus*, the rostrum is relatively longer and the brain case shorter and narrower than in *cynocephalus*. In addition, in *strepitus*, the tooth rows, particularly the lower, converge posteriorly somewhat more while the cheek teeth tend to be shorter and broader and the canines and incisors more massive than in *cynocephalus*. The young one is not old enough for positive identification.

Size. Largest ♂. 900. 670. 240. 62 mm.; juv. 330. 285. 105. 45 mm.

Enemies. The largest was taken in a wire-noose snare set in a corn

plantation by Timbuka natives, who apparently do not eat baboons. In the more thickly settled south, each baboon has a regular meat value equivalent to about 50 cents (U.S.); they are probably purchased by Nguru.

SCIURIDAE

Aethosciurus lucifer (Thomas)

Xerus (*Paraxerus*) *lucifer* Thomas, 1897, Proc. Zool. Soc. London, p. 430: Kombe Forest, Masuku Range [i.e. Matipa Forest, Misuku Mtns.], Nyasaland.

5 ♂♂, 5 ♀♀ (M.C.Z. 44143–52) Misuku Mtns. 23.ix–5.x.48.

Native name. *Kasira* (Misuku).

Discussion. This series of topotypes from Matipa Forest matches closely Thomas' description. The black dorsal patch is more or less sprinkled with orange-ringed hairs and less well defined than in a series of *lucifer* from Rungwe Mountain further north, probably because most of them are changing pelage. Otherwise the two series are indistinguishable.

Size. ♂. 245. 210. 52. 22 mm.; ♀. 235. 220. 51. 20 mm.

Breeding. On September 23 one ♀ held three ovules (preserved).

Parasites. I removed many mites from the ears of one old ♂, ticks (*Ixodes rasus*) from its head, and seven big fleas from the anal region. A bare patch on the small of the back of this animal indicated where it had been scratching.

Habits. Most of the females were shot shortly after dawn while calling "ku-whek, ku-whek." These squirrels are widely distributed throughout Matipa Forest and active at all hours of the day except in the vicinity of the main path where they are so alert and secretive as to be rarely seen.

Paraxerus palliatus palliatus (Peters)

Sciurus palliatus Peters, 1852, Bericht über Verhandl. K. Preuss. Akad. Wiss. Berlin, p. 273: mainland near Mozambique Island, Mozambique (restricted by Moreau et al, 1946, p. 416).

♂ (M.C.Z. 44140) Nchisi Mtn. 1.xii.48.

Native name. *Gorogoro* (Chewa).

Discussion. This individual probably belongs to Peters' race although it is markedly more ochraceous, less reddish than his figure (1852, p. 134, pl. xxxi, fig. 1).

Size. ♂. 200. 170. 48. 18 mm.

Remarks. This squirrel was noisily denouncing a lion that sought refuge in its thicket in Nchisi Forest; the following day it was again calling at 8:00 A.M. when shot. Another red squirrel was seen in Cholo Mountain forest.

Paraxerus cepapi sindi Thomas & Wroughton

Paraxerus cepapi sindi Thomas & Wroughton, 1908, Proc. Zool. Soc. London, p. 543: Tete, Mozambique.

4 ♂♂, 3 ♀♀ (M.C.Z. 44116–22) near Tete, M. 14–27.i.49.

Native name. Sindi (Nyungwe).

Discussion. This little series of topotypes is fairly uniform in color and matches well Thomas and Wroughton's description, except that the shoulders as well as the back of the thighs are bright ochraceous. Young individuals tend to be slightly less ochraceous than old ones. In all of them, the contrast between the bright shoulder patches and the rest of the back is very conspicuous.

Size. ♂. 190. 150. 38. 19 mm.; ♀. 175. 180. 38. 20 mm.; the youngest, a ♂, only 115. 120. 56. 16 mm.

Breeding. On January 14, a ♀ held two embryos measuring 65. 42. 14. ? 3 mm., the ears being folded and tiny. Still smaller embryos were present in another ♀ shot on the 18th.

Habitat. These squirrels live in the hollow baobabs on whose great limbs they like to bask in the early morning and late afternoon. It would seem as if they did not venture out at all on days when the temperature was 100° or over.

Paraxerus cepapi soccatus Wroughton

Paraxerus cepapi soccatus Wroughton, 1909, Ann. Mag. Nat. Hist. (8), **3**, p. 515: Vwaza, Hewe River, northern Angoniland, Nyasaland (Moreau et al, 1946, p. 416).

♂ ♀ (M.C.Z. 44141–2) near Vwaza Marsh. 21.ix.48.

Native name. Palimenti (Misuku).

Discussion. The topotypes of this race, when compared with a specimen of typical *cepapi* from the Transvaal, have the feet yellower and the back more rusty than described. The two forms are obviously different, however. While the browner *soccatus* lacks contrasting patches on shoulders and hindlegs, the grayer *cepapi* has the shoulders

faintly, and the hindlegs strongly, washed with ochraceous. Further, in *cepapi* there are typically three black rings on the hairs of the tail, while in *soccatus* there are two.

Size. ♂. 185. 150. 40. 20 mm.; ♀. 145. 155. 40. 19 mm.

Habitat. As we were driving through woodland eleven miles north of Katumbi, just before the turn-off to Vwaza (or Vwasa on some maps), one of these squirrels, hotly pursued by the other, rushed across the road with two more not far behind.

Paraxerus cepapi cepapoides Roberts

Paraxerus cepapi cepapoides Roberts, 1946, Ann. Transvaal Mus., **20**, p. 316: Zimbiti, near Beira, Mozambique.

9 ♂♂, 4 ♀♀ (M.C.Z. 44103–15) Mtimbuka. 11–21.ii.49.

Native names. Denga (Manganja); *gologolo* (Yao).

Discussion. Miss St. Leger (1932a, p. 960) has identified specimens from southern Nyasaland as *cepapi sindi*. Our rather large series from Mtimbuka differs from our topotypes of *sindi* in being larger (h.f. (s.u.) 42–46, av. 44.3 mm. in the former; 36–42, av. 38.8 mm. in *sindi*). The lower belly, and sometimes the chest and throat also, are washed with buffy instead of being clear white as in *sindi* and the rusty patches on rump and shoulder are less extensive and in less sharp contrast to the back. Compared with *soccatus*, the Mtimbuka animals are larger and darker, with the flanks, thighs and shoulders more reddish and three instead of two black rings on the hairs of the tail. No topotypes of *cepapoides* are available for comparison and Roberts does not compare this form with *sindi*. However, as nearly as can be told from his description, the Mtimbuka specimens are more closely related to this Beira form than to either *sindi* or *soccatus*. A complete understanding of the relationships of these three supposed forms must await further collecting.

Measurements. ♂. 205. 190. 45. 20 mm.; ♀. 200. 150+. 46. 21 mm.

Habitat. The entire series were shot right in Nkungumbi Village where they were chasing each other over thatches, granary bins, and the branches of trees. The first seven proved to be males, most of whom were suffering from a disfiguring skin disease that left large areas covered with black scabs; the hind limbs appeared particularly affected.

MUSCARDINIDAE

Claviglis nanus (de Winton)

Myoxus (*Eliomys*) *nanus* de Winton, 1897, Proc. Zool. Soc. London, for 1896, p. 799: Mazoe, Mashonaland, Southern Rhodesia.

♀ (M.C.Z. 44165) Misuku Mtns. 13.x.48.
2 yng. ♀ ♀ (M.C.Z. 44162–3) Nchisi Mtn. 27.xi–3.xii.48.

Native name. *Kadiamkwikwi* (Chewa).

Discussion. Except for its slightly larger size, the adult from the Misukus resembles closely the original description of *nanus*. Compared with *angolensis*, which is apparently a closely related form (not a *Gliriscus*), the bases of the hairs on cheeks and throat are gray, not white. Otherwise it resembles typical *angolensis* from Angola more than it does *a. jordani* from Northern Rhodesia. This latter is described as a larger animal with more white on the tail than the Misuku specimen. The specimens from Nchisi Mtn. probably belong to this form although they are too young for positive identification.

Size. ♀ ad. 97. 70. 17. 16 mm.; ♀ juv. 60. 42. 15. 10 mm.

Habitat. The two juveniles almost certainly lived in the thatched roof of Nchisi Boma; the youngest was found in a tin in the pantry and the slightly larger one was trapped in the pantry safe a week later, bananas being used as bait.

Claviglis johnstoni (Thomas)

Graphiurus johnstoni Thomas, 1897, Proc. Zool. Soc. London for 1896, p. 934: Zomba, Nyasaland.

♀ (M.C.Z. 44164) Misuku Mtns. 27.ix.48.
♂ (M.C.Z. 44161) Zomba Plateau. 7.ix.48.

Native name. *Kawundi* (Misuku).

Discussion. The topotype is a young animal that has not shed its milk premolars. The older animal from the Misukus, although differing in its slightly larger size and narrower tail from Thomas' description of *johnstoni* (not *johnstoni* Heller, which is a synonym of *griseus*), is best attributed to this form until the dormice are revised. Compared with a specimen of *murinus isolatus* from the Uzungwe Mtns., it differs in its larger size, bigger feet and ears, relatively shorter tail, and conspicuously larger skull with bigger teeth.

Whatever the names finally agreed upon for the African dormice, the two species found in the Misukus may easily be distinguished by

the browner, darker color of the form here called *johnstoni*. The brown tail is only faintly frosted with white laterally and lacks a white tip, the belly is gray, only faintly washed with buffy, and the larger, broader feet have a touch of brown on both metatarsals and metacarpals. Cranially the narrower skull, larger teeth and conspicuously smaller bullae, are the most distinctive characters.

Size. ♂. 65. 60. 15. 10 mm.; ♀. 97. 80. 17. 15 mm.

Parasites. Six larval ticks were removed from between the whiskers on muzzle of ♀, also a flea.

Habitat. In a termite-riddled pole, standing ten feet high, in forest clearing.

CRICETIDAE

Tatera lobengulae panja Wroughton

Meriones tenuis Peters (not A. Smith), 1852, Reise nach Mossambique, Säugeth., p. 149: Tete, Mozambique.

Tatera panja Wroughton, 1906, Ann. Mag. Nat. Hist. (7), **17**, p. 486: Chicosta, 60 miles above Tete, Zambezi River, Mozambique.

4 ♂♂, 3 ♀♀ (M.C.Z. 43907–12, –14) near Tete, M. 17–27.i.49.

Native name. *Panya* (Nyungwe; definitely specific).

Discussion. This series of near topotypes is distinguished by its pale color with the dorsal area, even in young animals, only slightly suffused with blackish. The black eye ring is reduced to a small spot at the anterior corner of the eye and the dark streak on the dorsal surface of the tail is not sharply defined. Cranially *panja* differs from its near neighbor *shirensis* in having a somewhat smaller skull with flatter braincase and more slender rostrum. These characters are slight but readily apparent when series are examined. The genus *Tatera* is so much in need of a complete revision that no attempt has been made to examine the specific status of *panja* and *shirensis*, although the series at hand suggests very strongly that the two forms are not more than subspecifically distinct.

Size. ♂. 140. 160. 30. 21 mm.; ♀ .130. 170. 31. 19 mm.

Tatera nyasae shirensis Wroughton

Tatera nyasae shirensis Wroughton, 1906, Ann. Mag. Nat. Hist. (7), **17**, p. 490: Malosa Mtn., Upper Shiré, Nyasaland.

1 ♂, 3 ♀♀ (M.C.Z. 43863, 43897–8, 43900) Nchisi Mtn. 27.xi–11.xii.48. 7 ♂♂, 4 ♀♀, 1 yng. (M.C.Z. 43875–84, –91, 44336) Chitala River. 16.xii.48;

2 ♂♂, 2 ♀♀ (M.C.Z. 43902–5) Mtimbuka. 7–21.ii.49.
2 ♂♂, 1 ♀ (M.C.Z. 43892, –95, 45139) Zomba Plateau. 6–9.ix.48.
4 yng. (M.C.Z. 44081–3, 44246) Chiradzulu Mtn. 27.viii.48.

Native names. *Kaloto* (Misuku); *tonondo* (Chewa and Ngoni).

Discussion. Wroughton (*loc. cit. supra*) says that Nyasaland *Tatera* divide into two well-marked color forms which are constant geographically, the southern one, *shirensis*, being more heavily suffused with blackish. He lists specimens from Fort Johnston as typical, so it is interesting to note that of the series at hand those from Mtimbuka, which is fourteen miles from Fort Johnston, are the palest with the dark markings around the eye and on the tail almost as reduced as in our series of *panja*. The series from Nchisi Mountain are the darkest, their blackish eye rings sometimes extending as an ill-defined line to the base of the ears. Specimens from Chitala are intermediate between these two. Individuals from a single locality resemble each other rather strongly and there seems to be a tendency for populations to develop slight, but well-marked, color differences. This may in part account for the rather large number of forms of *Tatera* currently recognized.

Size. ♂ (M.C.Z. 43904), 155. 165. 31. 20 mm.; ♀ (M.C.Z. 43880), 140. 165. 31. 22 mm.

Breeding. On August 27, a ♀ juv. was only 80. 59. 23. 13 mm., and on September 6, a ♂ juv. 78. 54. 23. 12 mm.

MURIDAE

Dendromus whytei whytei Wroughton

Dendromus whytei Wroughton, 1909, Ann. Mag. Nat. Hist. (8), **3**, p. 247: Fort Hill, Nyasaland.

♂ (M.C.Z. 44172) Nchenachena. 20.xi.48.
2 ♀♀ (M.C.Z. 44173–4) Nchisi Mtn. 1–3.xii.48.
♀ (M.C.Z. 44175) Cholo Mtn. 14.iii.49.
♀ (M.C.Z. 44171) Likabula River. 6.viii.48.

Native names. *Kamkoko* (Chewa); *kapamzimbi* (Manganja); *sonto* (Ngoni).

Discussion. No topotypes of this form were secured, but the obsolescent dorsal stripe, ochraceous suffusion of the undersurface, and the short, nail-like character of the fifth toe clearly distinguish this little series from Wroughton's *nyikae*. Wroughton lists both forms, from the Nyika Plateau which is also the type locality for *nyasae*, a situation resembling that found on Mt. Elgon. There four forms occur together, *Dendromus insignis*, which is closely related to

nyasae (Allen & Loveridge, 1933, p. 101), *whytei pallescens, ruddi* and *acraeus*, the last of which may be related to *nyikae*. Cranially, *whytei* is conspicuous for its small size and relatively broad flat palate with no well marked transverse ridge posteriorly.

Size. ♂. 66. 76. 16. 11 mm.; ♀ (M.C.Z. 44175), 75. 80. 16. 10 mm.

Dendromus mesomelas nyasae Thomas

Dendromus nyasae Thomas, 1916, Ann. Mag. Nat. Hist. (8), **18**, p. 241: Nyika Plateau, Nyasaland.

1 ♂, 2 ♀ ♀, 1 yng. (M.C.Z. 44167–70) Misuku Mtns. 14–15.x.48.
♂ (M.C.Z. 44166) Nyika Plateau. 13.xi.48.

Native name. Kanampwero (Misuku).

Discussion. The Nyika specimen is topotypical. The series from the Misuku Mountains match it closely.

Size. ♂ (M.C.Z. 44166), 83. 86. 18. 14 mm.; ♀ (M.C.Z. 44167), 78. 91. 20. 13 mm.

Diet. The Nyika ♂ was trapped in woodland forest with meat bait; a second specimen taken the same night was apparently eaten by some other rodent, as suggested by the characteristic way in which the back of the skull was gnawed.

Steatomys pratensis pratensis Peters

Steatomys pratensis Peters, 1846, Ber. über Verhandl. K. Preuss. Akad. Wiss. Berlin, p. 258: Tete, Mozambique.

♂ (M.C.Z. 43930) near Tete, M. 24.i.49.

Native name. Nsana (Nyungwe).

Discussion. The Tete *Steatomys* is a "cinnamon-brown" mouse, paler on the flanks, cheeks and around the eyes, and darker medially from the tip of the nose to the base of the tail. There is a very small white patch below the ear, and, as described, the hairs of the belly are white all the way to the base.

Size. ♂. 101. 52. 17. 15 mm.

Habitat. Taken from a shallow burrow in damp sand beneath debris left by the Zambezi on a sandbar. As it was surrounded by water the mouse may have reached the sandbar on a tree that had been swept from the river bank and cast up nearby.

Steatomys pratensis nyasae subsp. nov.

Type. M.C.Z., No. 44213, an adult male skin and skull from

Likabula River, Mlanje Mountain, Nyasaland. Collected by Arthur Loveridge, July 29, 1948.

Paratypes. M.C.Z., Nos. 44214–6 & 44218–27, being 8 ♂♂ and 5 ♀♀ with same data as type but collected between July 27 and August 1, 1948. Also a ♂ (M.C.Z. 44228) from Chitala River, Nyasaland, taken December 16, 1948.

Description. Steatomys pratensis nyasae is most easily told by its dark color, rather short tail, and the great reduction of the white patch below the ear.

In general color, the type is "sayal brown," heavily and finely speckled with blackish particularly in the mid-dorsal region. The flanks are brighter with fewer of the long, black-tipped guard hairs. The hands, feet and belly are white to the bases of the hairs and contrast sharply with the back. The cheeks are rather brighter than the flanks and there is a minute tuft of grayish hairs at the base of the ear, which is itself dark with a patch of blackish brown hair on the antero-external margin. The type series is fairly uniform in color. Occasional individuals sometimes have the flanks grayer than in the type, while the tuft of hairs at the base of the ears is sometimes white, always minute, and occasionally lacking. Compared with typical *pratensis*, *nyasae* is less reddish and much more heavily suffused dorsally with blackish. A topotype of *muanzae* from Tanganyika Territory is paler and grayer with conspicuous white patches below the ears. Topotypes of *pratensis kasaicus* from the Congo are larger and redder with a longer tail. Topotypes of *loveridgei* have not been seen, but two examples from Singida are much smaller and paler, especially on the face, with much more conspicuous white patches behind and below the ears.

Cranially, *nyasae* may be told by its lightly built but rather broad skull. As seen from above the wider braincase and zygomatic arches, and relatively narrower interorbital region, distinguish it from *p. pratensis*. *S. p. kasaicus* is a conspicuously larger form with relatively longer rostrum and slightly smaller bullae, while skulls of *loveridgei* are markedly smaller. Skulls of *muanzae* are not available for comparison.

Measurements. The seven fully adult individuals from Likabula are fairly uniform in size. Following are the measurements, in millimeters, of the type, and the largest (♀ M.C.Z. 44216) and smallest (♂ M.C.Z. 44222) of the series.

Field measurements: Head and body 95, 101, 86; tail 43, 41, 41; hind foot (*s.u.*) 15, 19, 17, on the dried skins the type and the other

male measure (*c.u.*) 17.8 and 17.5 respectively; ear 16, 15, 14.

Skull measurements: Greatest length 25.0, 25.8, br.; condylobasilar length 21.1, 22.9, 20.5; palatal length 13.2, 13.8, 12.6; zygomatic width 13.3, br., br.; width across bullae 12.2, 12.0, 12.0; maximum width of brain case taken above meatus 11.0, 11.3, 11.3; interorbital width 4.0, 4.2, 4.2; width outside molars 6.2, 6.3, 5.8; nasals 10.9, 10.7, br.; length of upper cheek teeth 4.2, 4.3, 4.2; length of lower cheek teeth 4.0, 4.0, 3.8 mm.

Discussion. Previous authors have considered the Nyasaland *Steatomys* to be the same as that from Tete, so these fourteen specimens from Likabula and the single individual from Chitala River are particularly valuable in establishing the distinctness of this new form. The museum also has a small series of skins and skulls from Chikore and Mt. Selinda forest in southeastern Southern Rhodesia, as well as a skin from Luiswishi River, Northern Rhodesia; none of these differs significantly from the type series. Apparently *nyasae* occurs in damp or forested country while the very distinct *pratensis* is a dry country form.

Native name. Mbewa (Nyanja).

Thamnomys (Grammomys) surdaster surdaster
Thomas & Wroughton

Thamnomys surdaster Thomas & Wroughton, 1908, Proc. Zool. Soc. London, p. 550: Zomba, Nyasaland.

2 ♂♂, 3 ♀♀ (M.C.Z. 43867–70, 43916) Misuku Mtns. 8–14.x.48.
♀ (M.C.Z. 43901) Nchisi Mtn. 27.xii.48.
yng. ♀ (M.C.Z. 44241) Mwera Hill. 13.xii.48.
3 ♂♂ (M.C.Z. 43864–5, 44242) Zomba Plateau. 7–9.ix.48.
2 ♂♂, 2 ♀♀, 3 yng. (M.C.Z. 43871–4, 44078–80) Cholo Mtn. 11–23.iii.49.

Native names. Kaliwambani (Ngoni); *nampwera* (Misuku); *sonto* (Chewa; Manganja).

Discussion. This whole series is fairly uniform in color and size, the older specimens tending to be more ochraceous on the back and flanks. In none of them is the buffy lateral line sharply defined and in the older of the two topotypes, as well as in one of the specimens from Cholo, it is entirely absent. Likewise the amount of buffy on the metatarsals varies. In some, including one topotype, the color is restricted to a median streak; in others it spreads across the whole foot. All of the specimens have white toes.

The skulls of the Zomba and Cholo series, including one with well worn teeth, are very uniform in size and slightly smaller than the two old individuals from the Misuku Mountains. An average slightly larger size for northern animals is also shown in our series from Tanganyika Territory.

Size. ♂ (M.C.Z. 43869), 122. 182. 24. 17 mm.; ♀ (M.C.Z. 43872), 115. 180. 22. 16 mm.

Breeding. On March 23, at Cholo, the largest ♀ was found with three nestlings whose eyes were still unopened; one of the three, a ♀, measured 60. 62. 14. 7 mm.

On December 13, at Mwera Hill, another nest was found in a lion's skin left in an open shed. One adult thicket-rat escaped, leaving a ♀ juv. 90. 125. 20. 16 mm.

While externally the Mwera nest is composed of rather coarse, though soft, grasses, the entire central portion consists of exceedingly fine soft fibres — possibly taken from sisal or similar substance used in the construction of the thatched grass hut. On the other hand, no grass appears to have been utilized in the construction of the Cholo nest whose exterior is formed of the stripped midribs of plants, possibly ferns, lined with other fine fibrous vegetable matter.

Thallomys ruddi (Thomas & Wroughton)

Thamnomys ruddi Thomas & Wroughton, 1908, Proc. Zool. Soc. London, p. 549: Tete, Mozambique.

♀ (M.C.Z. 43866) Mtimbuka. 26.ii.49.
♀ (M.C.Z. 43906) near Tete, M. 19.i.49.

Native name. *Mbewa* (Nyungwe).

Discussion. The specimen from Tete is slightly larger than the measurements given for the type and has a faint dusky streak down the center of the metatarsals; otherwise it agrees closely with the original description and undoubtedly represents this form characterized by its big bullae and small teeth. The species *ruddi* was described as a *Thamnomys* some years before Thomas erected the genus *Thallomys* for the bushy tailed South African tree rats with large bullae and later authors have included *ruddi* in the *Grammomys* section of the former genus. Even Ellerman leaves it there although he notes certain resemblances to *Thallomys*. Actually *ruddi* resembles *Thallomys damarensis* and *moggi* far more closely than it does *Grammomys*. The greatly enlarged bullae, particularly the posterior section behind

the meatus, the less divergent supraorbital ledges with a more pronounced tendency towards the formation of a postorbital process, and the deeper pterygoid fossae, are all characteristic of *Thallomys*. In reduction of the cusps of $M^1/_1$ and $M^2/_2$ *ruddi* also agrees with *Thallomys*. Both genera show a reduction in the posterointernal and posteroexternal cusps of $M^1/$ and in the posterointernal, posteroexternal and anteroexternal cusps of $M^2/$ but this is carried farther in *Thallomys*. Similarly in the lower jaw there is a greater reduction of the median and external supplementary cusps in *Thallomys* than in *Thamnomys*. Externally, the traces of gray markings around the eyes and extending in an ill-defined line towards the nose, the absence of an ochraceous lateral line, shorter tail, and broad, heavy feet, are all characters which readily distinguish *ruddi* from *Thamnomys*. In view of Ellerman's inclusion in *Thallomys* of the *namaquensis* group of *Aethomys*, it is interesting to note that in cranial characters, particularly in the reduction of cusps and in the more acute angle of those of the lower jaw, *ruddi* resembles *Thallomys* more closely than do the races of *namaquensis*.

The specimen from Mtimbuka is a smaller, younger animal, somewhat darker than the topotype with similar markings on the hind and fore feet. Length of tooth row is the same in both, although the teeth are unworn in the Mtimbuka specimen and the skull is smaller.

Size. Topotype ♀. 130. 180. 25. 22 mm.; Mtimbuka ♀. 125. 146. 23. 16 mm.

Rattus rattus kijabius (Allen)

Mus kijabius J. A. Allen, 1909, Bull. Am. Mus. Nat. Hist., **26**, p. 169: Kijabe, Kenya Colony.

♂ ♀ (M.C.Z. 43926–7) Misuku Mtns. 23.ix.48.
♀ (M.C.Z. 43925) Nchisi Mtn. 27.xi.48.
♂ (M.C.Z. 43928) Zomba Plateau. 8.ix.48.
yng. ♀ (M.C.Z. 43924) Chiradzulu Mtn. 27.viii.48.
♀ (M.C.Z. 43923) Cholo Mtn. 21.iii.49.
♀ (M.C.Z. 43929) Likabula R. 1.viii.48.
1 ♂, 2 ♀♀ (M.C.Z. 43920–2) near Tete, M. 10–14.i.49.

Native names. *Koswe* (Chewa; Ngoni); *makwisi* (Nyungwe); *ukusa* (Misuku).

Discussion. Although the Tete animals come from the type locality of Peters' *Mus tettensis* which has been considered synonymous with

R. r. alexandrinus, the series at hand are clearly referable to the East African form, *kijabius*.

Size. ♂ (M.C.Z. 43922), 150. 195. 33. 21 mm.; ♀ (M.C.Z. 43920), 170. 185. 31. 23 mm.

Enemies. A halfgrown roof rat was recovered from the stomach of a sand-snake (*Psammophis s. sibilans*) at Tete.

Aethomys chrysophilus ineptus (Thomas & Wroughton)

Mus chrysophilus ineptus Thomas & Wroughton, 1908, Proc. Zool. Soc. London, p. 546: Tete, Mozambique.

2 ♂♂ (M.C.Z. 43896, 43899) Nchisi Mtn. 8–9.xii.48.
3 ♂♂, 1 ♀ (M.C.Z. 43893–4, 43915, 44240) Zomba Plateau. 7–8.ix.48.

Native name. Tonondo (Chewa & Ngoni, who do not distinguish it from *Tatera n. shirensis*).

Discussion. These specimens belong to the *chrysophilus* section of *Aethomys*. They have the rather narrow, flat skulls described for *ineptus*, and have been referred to this race although they differ from Thomas and Wroughton's description in certain details, notably their shorter tails and rostra.

Dr. T. S. C. Morrison-Scott has kindly re-examined Whyte's series from the Nyika Plateau and confirms Thomas' account (1897a, p. 430) of two separate species there. The one described by Thomas as *nyikae* and later called *chrysophilus nyikae* by Ellerman, is not a race of *chrysophilus*. The other called *chrysophilus* by Thomas clearly belongs to this species but probably is subspecifically distinct.

Before the discovery of *c. ineptus* at Tete, the range of *c. chrysophilus* was supposed to extend from Mashonaland at least as far as the Nyika Plateau. With the description of a distinct race from within this range the status of the northern animal needs to be re-examined.

Size. ♂ (M.C.Z. 43896), 145. 170. 30. 21 mm.; ♀ (M.C.Z. 43894), 145. 160. 27. 19 mm.

Parasites. A ♂ killed in the pantry of Nchisi Boma, had a large tick (*Ixodes* sp.) among his whiskers, a smaller one on the throat. Both preserved.

Praomys jacksoni delectorum (Thomas)

Epimys delectorum Thomas, 1910, Ann. Mag. Nat. Hist. (8), **6**, p. 430: Mlanji [i.e. Mlanje] Plateau, 5500 ft., Nyasaland.

6 ♂♂, 4 ♀♀, 1 yng. (M.C.Z. 44012–3, –15–20, 44244, –50, –53) Misuku Mtns. 1–14.x.48.

5 ♂♂, 5 ♀♀ (M.C.Z. 44021–30) Lichenya Plateau, Mlanje Mtn. 12–21.viii.48.

Native names. *Jikagada* (Nguru); *ngusuka* (Misuku, also for *Lophuromys*).

Discussion. I have followed G. M. Allen in considering *jacksoni* distinct from the West African species *tullbergi*. The topotypical series from Mlanje varies little in age and is fairly uniform in pattern, all have the lower back suffused with blackish and the flanks, cheeks and nape more brightly colored. These areas may be either reddish or ochraceous, and the belly in all specimens is washed, more or less heavily, with pinkish buff. In the oldest of the series the long black tips of the rump hairs have turned dark reddish brown and the narrow subterminal bands are very inconspicuous. In one such specimen, which is molting, the new hair is much more brightly colored, with the pale subterminal rings in sharp contrast to the black tips. Evidently fading as well as age is responsible for the reddish rump so often found in this genus.

The Misuku series varies more both in age and in color than the topotypes. Those that are comparable in age with the Lichenya series resemble them rather closely in dorsal color except for one which is in the bright, rusty-reddish phase so often found in related subspecies. Four considerably older animals have a more extensive reddish-brown rump patch than any of the topotypes. A slight, but I think taxonomically unrecognizable, distinction may be made between the northern and southern series on the basis of the grayish white rather than pinkish buff tips on the belly hairs in the former, and the slightly greater average size of the hind feet and ears. Compared with *P. j. melanotus* from the nearby mountains to the north of Lake Nyasa, all of the Nyasaland specimens differ in their much brighter, less blackish, coloring.

Cranially our topotypes show that *delectorum* may be distinguished from *melanotus* by having the width across the tooth rows less in proportion to the length of the tooth row, the individual teeth somewhat smaller, and the zygomatic plate narrower. The differences are average rather than absolute and the Misuku series is intermediate towards *melanotus*.

Size. ♂ (M.C.Z. 44244), 115. 137. 24. 19 mm.; ♀ (M.C.Z. 44020), 105. 135. 24. 21 mm.

Diet. All taken in mousetraps baited with bread, cheese or raisins.

Parasites. A flea from a Mlanje mouse, and mites from a Misuku specimen were preserved.

Habitat. On Mlanje most of the mice were trapped in the copse behind "Araloon Cottage," but several were taken in the house itself. The Misuku material was obtained from traps set beside the stream flowing through Matipa Forest, and none was taken outside the forest.

Mastomys coucha microdon (Peters)

Mus microdon Peters, 1852, Reise nach Mossambique, Säugeth., p. 149: Tete and Boror, Mozambique.

♂ ♀ (M.C.Z. 44013, 44032) Misuku Mtns. 28.ix–9.x.48.
♂ (M.C.Z. 44031) Nchenachena. 19.xi.48.
5 ♂♂, 6 ♀♀, 1 ? (M.C.Z. 44055–66) Nchisi Mtn. 26.xi–7.xii.48.
2 ♂♂, 4 ♀♀ (M.C.Z. 44045–50) Chitala River. 16.xii.48.
4 ♂♂ (M.C.Z. 44051–4) Zomba Plateau. 7–8.ix.48.
10 ♂♂, 1 ♀, 3 yng. (M.C.Z. 44067–77, 44247–9) Chiradzulu Mtn. 28–30.viii.48.
♀ (M.C.Z. 44183) Cholo Mtn. 11.iii.49.
10 ♂♂, 2 ♀♀ (M.C.Z. 44033–44) Likabula River. 29.vii–2.viii.48.

Native names. Mpuku (Chewa; Manganja); *ngwede* (Nyanja); *ukusa* (Misuku).

Discussion. No topotypes of this form were collected, and the series from Likabula River, Chiradzulu Mountain and Zomba Plateau are mostly youngish, characteristically dark animals. From farther north, the series of well grown adults taken at Chitala and Nchisi vary in color from reddish brown, particularly on the rump and flanks, to grayer brown entirely lacking any such tinge. Specimens previously identified as *victoriae*, from Ukerewe Island and the mountains to the north of Lake Nyasa are almost equally variable and the total average differences between the two series are but slight. These may be summarized as follows: adults of *microdon* tend to have the flanks brighter and the dorsal surface more yellowish gray than in our *victoriae*, while such individuals as are reddish have a greater concentration of this color on the rump and lower back; young *microdon* average somewhat less dark than comparable individuals of the northern race. These characters are not good enough to positively identify isolated specimens, so the identification of the Nchenachena and Misuku animals is subject to revision if longer series from the same place do not confirm their apparent closest resemblance to

microdon. Cranially, specimens of *microdon* of comparable age vary less than externally. A slight flattening of the braincase, common to old individuals, is not entirely an age character, and there is considerable variation in the anterointernal cusp of $M^1/$. In a very few individuals this cusp is definitely bilobed; most have a trace of an enamel reentrant while in some it is entirely single. Further, in some skulls the pattern differs on each side.

Size. ♂ (M.C.Z. 44057), 133. 111. 24. 19 mm.; ♀ (M.C.Z. 44075), 120. 117. 22. 17 mm.

Breeding. On August 28, three nestlings were brought in, of which the largest measured 79. 67. 19. 16 mm.

Diet. Cheese bait served to trap one beneath my bed at Likabula camp where it had disturbed me twice the previous night.

Enemies. Apparently it was one of these multimammate mice that I recovered from the stomach of a striped sand-snake (*Psammophis s. sudanensis*).

Leggada musculoides marica Thomas

Leggada bella marica Thomas, 1910, Ann. Mag. Nat. Hist. (8), **5**, p. 88: Beira, Mozambique.

♀ (M.C.Z. 44230) Nchisi Mtn. 11.xii.48.
♀ (M.C.Z. 44229) Likabula River. 31.vii.48.
♂ (M.C.Z. 44231) Cholo Mtn. 21.iii.49.

Discussion. Our three specimens are from the northern end of the rather extensive range assigned this race by Thomas. It and related forms were previously regarded as subspecies of *bella*. Actually they are all closely related to *musculoides* of West Africa (cf. Lawrence, 1945, pp. 91–92) which has priority.

Size. ♂. 57. 40. 12. 8 mm.; ♀ (M.C.Z. 44230), 56. 45. 11. 8 mm.

Leggada triton murilla Thomas

Leggada triton murilla Thomas, 1910, Ann. Mag. Nat. Hist. (8), **5**, p. 91: Machakos, 5400 ft., Kenya Colony.

5 ♂♂, 2 ♀♀ (M.C.Z. 44085, 44234–7, 45137–8) Misuku Mtns. 24.ix–15.x.48.
♂ (M.C.Z. 44239) Nyika Plateau. 12.ix.48.
♀ (M.C.Z. 44252) Vipya Plateau. 18.ix.48.
2 ♂♂, 1 ♀ (M.C.Z. 44084, 44232–3) Nchisi Mtn. 27.xi–9.xii.48.
2 ♀♀ (M.C.Z. 44238, 44251) Zomba Plateau. 2–4.ix.48.
2 ♂♂ (M.C.Z. 43749, 43752) Cholo Mtn. 17.iii.49.
♂ (M.C.Z. 45136) Lichenya Plateau. 16.viii.48.

Native names. *Kalota* (Misuku); *mende* (Ngoni); *tsibwi* (Chewa).

Discussion. Both externally and cranially these mice are indistinguishable from our rather variable series of *murilla* from the mountains to the north of Lake Nyasa. In individuals from both areas the "pinkish buff" lateral line varies markedly in width though a trace of it is always present, while occasionally the belly hairs are tipped with "pinkish buff" rather than "ivory white." This is apparently a rather widespread form in Nyasaland though not reported from there before.

Size. ♂ (M.C.Z. 43749), 85. 62. 15. 13 mm.; ♀ (M.C.Z. 44236), 75. 55. 15. 12 mm.

Breeding. On September 24 a crude nest composed of rootlets and grass, both coarse and fine, was found beneath vegetable debris on the Matipa Ridge. The nest measured 90 x 70 x 70 mm. over all and held the ♀ whose measurements are given above and two young measuring 64–65. 46. 15. 10 mm. A still smaller ♂ (57. 40. 12. 8 mm.) was found on March 21 beneath a pile of sodden and rotting grass on Cholo.

Parasites. A flea was preserved from a young mouse caught in Matipa Forest on 15.x.48.

Enemies. One pigmy mouse was recovered from the stomach of a house-snake (*Boaedon l. lineatus*) on Nchisi Mtn.

Cricetomys gambianus viator Thomas

Cricetomys gambianus viator Thomas, 1904, Ann. Mag. Nat. Hist. (7), **13**, p. 413: Likangala [Likangala River rises in the central part of Zomba District and flows eastward to empty into Lake Chilwa], Nyasaland.

♂ (M.C.Z. 44137) Cholo Mtn. 22.iii.49.

Native name. *Bwampini* (Manganja).

Discussion. This young adult ♂ resembles closely Thomas' original description, although the type is obviously an older animal. Compared with our series of *viator* from Rungwe Mountain at the northern end of Lake Nyasa, it differs in having a whiter and somewhat more thinly haired belly. Otherwise the animals from the northern and southern ends of the lake are indistinguishable.

Size. ♂. 320. 322. 72. 40 mm.

Parasites. Ticks (*Ixodes ampullaceus*) and a hemimerid (*Hemimerus deceptus*) were present in the fur of this giant rat which was snared deep in the forest.

Lophuromys aquilus aquilus (True)

Mus aquilus True, 1892, Proc. U. S. Nat. Mus., **15**, p. 460, text fig. 1: Kilimanjaro Mtn. 8,000 ft., Tanganyika Territory.

4 ♂♂, 1 ♀, 2 ? (M.C.Z. 44005–11) Misuku Mtns. 1–15.x.48.
4 ♂♂, 3 ♀♀, 3 ? (M.C.Z. 43984–93) Nyika Plateau. 30.x.–15.xi.48.
2 ♂♂ (M.C.Z. 43994–5) Vipya Plateau. 18.ix.48.
7 ♂♂, 2 ♀♀ (M.C.Z. 43996–44004) Zomba Plateau. 2–10.ix.48.
6 ♂♂, 3 ♀♀, 1 ? (M.C.Z. 43974–83) Lichenya Plateau. 10–13.viii.48.

Native names. Etwa (Nguru); *ngusuka* (Misuku, as also for *Praomys*); *tobora* (Ngoni).

Discussion. This is another exceedingly variable species in both color and dentition. Recent workers with long series available for study agree as to the difficulty of dividing it subspecifically. As a whole, the series from different localities in Nyasaland matches very closely the series from the mountains of southwest Tanganyika discussed by Allen and Loveridge (1933, p. 114). There is, however, a very interesting difference in the homogeneity of local populations, with the northern ones tending to vary more than the southern. Thus ten specimens from Kigogo in the Uzungwe Mountains, Tanganyika Territory, all taken in January, vary tremendously. The back is either dark and finely speckled or paler and more coarsely speckled; the belly hairs vary from those which lack dark bases and are entirely pinkish to those which are grayish at the base and have the tips more ochraceous; the hind feet in some have the dark metatarsal mark spread over most of the foot, including the toes; in others the toes are pale and the metatarsal mark is almost absent. To the south some of these same characters have become definitely established in certain of the populations. The series from Zomba and Lichenya lack pale coarsely speckled individuals, and the bellies are more uniformly pinkish. The Zomba series all have dark toes with the metatarsals almost entirely dark. In the Lichenya series the feet vary more. Back and belly vary more in the Nyika series but the color of the feet is rather constant. Here the toes are pale and the metatarsals ochraceous buff with a more or less reduced dusky mark externally. Finally, in rats from the Misukus the total variation is almost as great as in the Kigogo series.

Examination of the skulls shows that the Nyika series, collected in November, contains a higher proportion of larger, older individuals than the Lichenya and Zomba series collected in August and September respectively. In addition, there is a tendency for individuals at the

same stage of development to be very slightly larger in northern Nyasaland than in the south.

This species was reported from the Nyika Plateau by Thomas (1897b, p. 936) although Whyte and Johnston apparently did not collect it in southern Nyasaland. The specimens collected by Loveridge were all hardened in formalin overnight and then thoroughly washed before skinning. This is a method which he has used in the past with *aquilus* to keep their delicate skins from tearing.

Size. ♂ (M.C.Z. 43984), 145. 83. 21. 18 mm.; ♀ (M.C.Z. 44003), 135. 67. 19. 17 mm.

Diet. Omnivorous; stomach contents of Mlanje mice included earthworms and grubs. On the Nyika, one held the belly skin and hind foot of an adult *Bufo taitanus* subsp. nov.

Parasites. A small tick (*Ixodes* sp.) was crawling over a harsh-furred mouse trapped in the Matipa Forest. A large tick, a flea and mites were present on a Nyika specimen's fur that was alive with lice whose eggs were attached to the bases of adjacent hairs. The left ear of this mouse was ragged and bleeding as if it had been scratching frantically.

Habits. Obviously diurnal, as revealed by trapping. At 8 A.M. a harsh-furred mouse was killed with a stick by my gunbearer as it was feeding beside the path in open, secondary forest on Zomba Plateau.

Habitat. On the Nyika this mouse was as much at home in open, marshy vleis as in woodland.

Beamys major Dollman

Beamys major Dollman, 1914, Ann. Mag. Nat. Hist. (8), **14**, p. 428: Mlanje Nyasaland.

♀ & 4 yng. (M.C.Z. 44206–10) Nchisi Mtn. 1.xii.48.

Native name. Chidiubaya (Nchesi: "because it carries things off to its burrow.")

Discussion. The Nyasaland form of this rare genus differs from the type species in its larger size. Cranially the Nchisi adult is even larger than the type of *major* and differs further in having the tail mottled throughout its entire length instead of being merely white tipped. Of interest also is the minute, anterointernal cusp on M^1, conspicuously present in the newly erupted, unworn teeth of all four of the young, and not entirely obliterated in the well-worn teeth of the adult ♀. Typically this cusp is supposed to be entirely lacking, indeed

the cusp formula of 2, 3, 3 for $M^1/$ is one of the principal generic characters of *Beamys*. The genus, however, is known from very few specimens. *B. major* was apparently described from a single individual, and so until better series can be obtained it seems best to assume that the occasional presence of a very small anterointernal cusp on $M^1/$, as well as the mottling of the entire tail, are part of the normal variation of this large southern form.

Size. ♀. 160. 140. 22. 23 mm. ♂ juv. 111. 55. 20. 13 mm.; ♀ juv. 102. 52. 20. 13 mm.

Breeding. On December 1 this mother and her four, well-grown young were brought in by a Chewa native.

Saccostomus campestris campestris Peters

Saccostomus campestris Peters, 1846, Ber. über Verhandl. K. Preuss. Akad. Wiss. Berlin, p. 258: Tete, Mozambique.

♂ (M.C.Z. 44212) near Tete, M. 17.i.49.

Native name. Suku (Nyungwe).

Discussion. This topotype is a rather pale, brownish gray animal, slightly darker on the nape and back than on the flanks. Following Ridgway, it is about "light drab" washed with "avellaneous." The line of demarcation between the pure white undersurface and the dark back is high up on the sides of the face and the flanks, leaving the fore legs entirely white. On the hind legs the dark dorsal color extends in a narrow strip as far as the ankles.

Size. ♂ yng. 115. 41. 17. 15 mm.

Saccostomus campestris elegans Thomas

Saccostomus elegans Thomas, 1897, Proc. Zool. Soc. London, p. 431: Karonga, Lake Nyasa, northern Nyasaland.

♀ (M.C.Z. 44201) Nchisi Mtn. 6.xii.48.
♂, 1 yng. (M.C.Z. 44211, 44243) Mtimbuka. 18–22.ii.49.
♀ (M.C.Z. 44217) Likabula River. 1.viii.48.
1 ♀, 3 yng. (M.C.Z. 44202–5) Ruo River. 1.iv.49.

Native names. Chatute (Chewa; Ngoni; Nyanja); *dugu* (Nyanja).

Discussion. The four adults of varying ages agree in differing from *campestris* in the darker, more slatey, color of the back as well as in the relation of dark and pure white areas. In all four the line of demarcation is lower on the flanks than in *campestris*, the thighs are

more extensively dark and there is an unbroken dark strip from the shoulders down onto the forelegs.

Probably this whole series is *elegans* although only some of Thomas' cranial characters are apparent and none of these is as well developed as he found it to be. *S. elegans* is described as having a much longer and narrower skull than *campestris* with less widely open antorbital foramina, narrower interorbital region, differently shaped interparietal and smaller palatal foramina. Comparison of the series at hand with a topotype of *campestris*, shows no significant differences in shape of interparietal and size of palatal foramina. The Nchisi, Mtimbuka and Likabula specimens, which are similar in size as well as in skull length to this topotype, do differ from it, as described by Thomas, in having the antorbital foramen slightly less widely open and the skull slightly narrower and flatter. Further all four *elegans* have a median spine on the posterior margin of the palate. Altogether, cranial differences between the two forms are but slight and Ellerman (1941, vol. 2, p. 285) is undoubtedly correct in saying that the two forms are only subspecifically distinct.

Size. ♂ (M.C.Z. 44211), 122. 35. 16. 16 mm.; ♀ (M.C.Z. 44202), 121. 39. 18. 17 mm.

Breeding. On February 18 a nestling ♂, measuring only 51. 18. 10. ? 4 mm., was picked up on the path.

Acomys selousi de Winton

Acomys selousi de Winton, 1897, Proc. Zool. Soc. London, for 1896, p. 807, pl. xl, fig. 2: Essex Farm, near Bulawayo, Matabeleland, Southern Rhodesia.

4 unsexed (M.C.Z. 44186–9) Nchenachena. 22.xi.48.
♂ (M.C.Z. 44200) Chiradzulu Mtn. 27.viii.48.

Native names. Kachenzi (Chewa; Nyanja); *sakachenzi* (Ngoni).

Discussion. These medium sized, rather brightly colored, spiny mice agree closely with de Winton's original description, one of the young adult skulls being almost identical in measurements with those of the type of *selousi*. Further, a topotype of *Acomys ignitus* differs from our Nyasaland series exactly as Dollman (1910, p. 230) says *ignitus* and *selousi* differ. In the latter, the smaller size, duller color, more finely haired, less coarsely scaled tail, and palatal foramina not reaching beyond the level of the first lamina of M^1/ are all conspicuous features. Not mentioned by Dollman, but equally conspicuous in *selousi*, are the

smaller bullae and absence of a latero-ventral ridge on the zygomatic arch.

Size. ♂. 93. 60. 17. 13 mm.

Diet. Trapped with cheese bait.

Habitat. Nchenachena is the only place where I have found spiny mice common in East Africa. On November 21 five mice were taken in six traps set, but all their ears were eaten off in addition to several snouts and other parts. The following day four were taken in the six traps, and though in much the same condition as those taken the day before, it seemed advisable to save them though unsexed and without measurements.

Dasymys incomtus alleni subsp. nov.

Dasymys ? helukus Allen & Loveridge (not of Heller), 1933, Bull. Mus. Comp. Zool., **75**, p. 115: from Uzungwe, Ukinga, Rungwe and Poroto Mountains.

Type. M.C.Z. No. 26322, an adult male skin and skull from Ilolo, Rungwe Mountain, Tanganyika Territory. Collected by Arthur Loveridge, March 31, 1930.

Paratypes. The half-dozen specimens from five localities listed in the above citation; also

2 ♂♂, 1 ♀ (M.C.Z. 44177–9) Misuku Mtns. 24.ix–4.x.48.
2 ♂♂ (M.C.Z. 44180–1) Lichenya Plateau. 10–12.viii.48.

Description. Dasymys incomtus alleni is most easily distinguished by its heavy rostrum and broad nasals, depressed at the tip.

This is a rather uniformly colored race with no dark suffusion in the center of the back. In fresh adult pelage, the pale "ochraceous tawny" subterminal rings contrast sharply with the black tips of the hairs and give the animal a rather dark yellowish brown appearance above. The sides, lacking the dark tips, are brighter and merge gradually with the "pale olive-buff" of the undersurface. Compared with a series of *helukus* from Kaimosi, Kenya Colony, the type of *alleni* is noticeably more yellowish on the belly and flanks; additional specimens from the region to the north of Lake Nyasa also average brighter in this respect. These differences are slight, and on the basis of external characters alone it is not always possible to distinguish the two races. Compared with a topotype of *medius, alleni* is noticeably brighter, particularly on the head, while specimens of *fuscus* from Mt. Selinda, Southern

Rhodesia, are less conspicuously speckled, have a concentration of dark down the middle of the back, and grayer flanks.

Cranially, *alleni* is quite distinct and fully grown adults can readily be identified by the heavy rostrum with broad nasals bent down at the tip and sometimes inflated on each side of the midline. This, combined with the abruptly expanded, rather heavy, supraorbital ridges, gives the skulls a somewhat massive appearance, particularly as compared with *nigridius* and *savannus*, and, to a certain extent, with *helukus*. Further, *alleni* has the width across the roots of the incisors somewhat greater in proportion to the length of the diastema than comparable animals of the other three races (width across roots of incisors more than 50 per cent of distance from front of molars to alveolar point in *alleni*, less than 50 per cent in *nigridius*, *savannus* and *helukus*).

Certain other less obvious characters help to distinguish *alleni*. As compared with *helukus* the teeth average larger and the palate narrower. The interparietal suture is shorter than, or as long as, the frontoparietal suture from the midline to the supraorbital ridge, whereas in *helukus* the interparietal suture is longer. The zygomatic arch in *alleni* tapers rather evenly, whereas in *helukus* it is broadly expanded in the maxillojugal region and then narrows abruptly posterior to the ventral end of the maxillojugal suture. The antorbital foramen as seen from above is shallower in *alleni* with a less well-marked pocket anteriorly by the root of the incisor. A topotype of *medius* is intermediate between *helukus* and *alleni* in a number of ways. In general shape and proportions, as well as in its heavy rostrum, it resembles *alleni*. The nasals, however, are less bent down at the tip and narrower. The interparietal suture is long and the antorbital foramen rather deep as in *helukus*. Typical *medius* comes from the Ruwenzori Mountains; from farther south, on Idjwi Island in Lake Kivu, we have a specimen which resembles *alleni* even more closely in structure of the rostrum.

A specimen of *fuscus* from Mt. Selinda has a less angular skull with the interorbital region less sharply constricted, the supraorbital ridges more evenly diverging, the rostrum rather massive but with slender nasals bent down at the tip, and relatively large teeth.

Measurements. Measurements in millimetres are given of the type.

Field measurements: head and body 172; tail 151; hind foot 31; ear 19 mm.

Skull measurements: greatest length 36.3; condylo-basal length 36.2; palatal length 21.2; zygomatic width 19.1; mastoid width 14.4;

interorbital width 4.6; width outside molars 7.7; nasals 5.8 x 4.7; alveolar length of upper cheek teeth 7.5 mm.

Discussion. In the absence of sufficient comparative material, the type and other specimens from the mountains north of Lake Nyasa were tentatively referred to *helukus* by Allen & Loveridge (*loc. cit. supra*). The fact that races of *helukus* were not reported from the Lake region on the edge of the Congo basin, implied that *helukus* had spread in its typical form easterly and southerly to reach this area. The distribution problem was further complicated by the description of two distinct races, *saramnus* and *nigridius* from south central Kenya. To the west, *medius* was supposed to be a race of *bentleyae*. Actually the evidence at hand shows that Ellerman (1941, p. 121) is probably correct in considering the East African and Lake region forms as all belonging to the same species. Cranially, *saramnus*, *nigridius* and *helukus* resemble each other closely. Of the three, the westerly form *helukus* approaches *medius* in certain traits; *medius* in turn is closer to *alleni* than any of the three northern and eastern forms, while the above-mentioned specimen from Idjwi Island is clearly intermediate between *medius* and *alleni*. Apparently then, one type of animal evolved moving east into the Kenya forests, and another moving south through the lake region to reach its extreme development in the mountains north of Lake Nyasa. Animals from the Matipa-Wilindi Ridge in the Misuku Mountains of Nyasaland are less extreme than the type and associated series. Specimens from southern Nyasaland are intermediate between the Misuku series and *fuscus* from Mt. Selinda with the somewhat darker color and less expanded nasals of the latter.

It gives me great pleasure to name this form after the late G. M. Allen, whose careful work has contributed so much to our knowledge of African mammals.

Native names. *Kiraswa* (Nguru); *mbewa* (Misuku, but not specific).

Pelomys fallax insignatus Osgood

Pelomys fallax insignatus Osgood, 1910, Ann. Mag. Nat. Hist. (8), **5**, p. 276: Fort Hill, northern Nyasaland.

4 ♀♀, 1 ? (M.C.Z. 43931–5) Misuku Mtns. 23.ix–15.x.52.
♀ (M.C.Z. 43945) Nchenachena. 20.xi.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 43937–40) Nchisi Mtn. 27.xi–2.xii.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 43941–4) Zomba Plateau. 2.ix.48.
♀ (M.C.Z. 43936) Cholo Mtn. 10.iii.49.

Native names. Bvumbi (Manganja); *mbewa* (Misuku); *mende* (Chewa and Ngoni).

Discussion. The specimens from Matipa-Wilindi Ridge in the Misukus are near topotypes of this form and agree with Osgood's description in lacking a medial dorsal stripe. Ventrally the hairs are uniformly tipped with "ochraceous buff" or else, in the inguinal and throat region, are slightly whiter. Series from Nchisi Mountain and Zomba Plateau average somewhat less buffy ventrally and three of the Zomba specimens have an ill-defined dorsal streak. Kershaw (1922, p. 191) identifies his series from Cholo and Chiromo as *fallax*, which is typically striped, although only three of his ten specimens show any trace of a dorsal stripe. While agreeing with him that this character is not constant, it is also apparent that, as stated by Osgood (*loc. cit. supra* p. 277), "in specimens from more northerly localities it is increasingly indistinct and becomes entirely absent in those from Northern Nyasa." Another striped race, *iridescens*, has been described from the Taita Hills. Comparison of a young topotype of this form with a Misuku rat of similar age shows that, in addition to possessing a well marked dorsal stripe, the former has the sides from chin to thighs darker owing to the shorter subterminal pale rings, and the ventral surface is grayer. A specimen from the Usambaras and the Uluguru series, previously identified as *fallax* (Allen & Loveridge, 1927, p. 437), differs in the same way from Nyasaland animals and should be referred to *iridescens*. A young adult specimen from Magrotto lacks the dorsal stripe and may be intermediate towards *insignatus*.

Cranial differences between *insignatus* and the Uluguru-Usambara *iridescens* are slight, and average rather than absolute. In general, in the latter, the rostrum is larger and heavier in proportion to the size of the braincase, the nasals project farther in front of the incisors and the latter are more recurved. Skulls of *insignatus* tend to have the parietal ridges more broadly spreading and the parietals more domed, which gives the braincase a deceptively broader appearance.

Size. ♂ (M.C.Z. 43942), 156. 127. 26. 18 mm.; ♀ (M.C.Z. 43936), 165. 155. 30. 18 mm.

Lemniscomys griselda calidior (Thomas & Wroughton)

Arvicanthis dorsalis calidior Thomas & Wroughton, 1908, Proc. Zool. Soc. London, p. 545: Tambarara, Gorongoza Mtns., Zambezia, Mozambique.

♂ (M.C.Z. 44127) Likabula River. 31.vii.48.

1 ♂, 3 ♀ ♀ (M.C.Z. 44128–30, 44182) near Tete, M. 8–27.i.49.

Native names. *Mpera* (Nyanja); *mponi* (Nyungwe); *nangwavi* (Yao).

Discussion. The original description includes both Beira and Tete in the range of this subspecies, and it is interesting to find that the Likabula specimen does not differ significantly from our Tete series.

Parasites. Many mites were preserved from the fur of the Likabula rat.

Enemies. What appeared to be the rump and tail of one of these striped grass-rats was recovered from the stomach of a house-snake (*Boaedon l. lineatus*) at Likabula.

Habitat. As we were driving towards Tete, one of these semi-diurnal rodents raced across the road and sought refuge among the sparse dry grass that had grown up through a pile of brambles. As we approached its refuge the rat dashed out and went down a shallow burrow where we found it six inches beneath the surface.

Lemniscomys striatus massaicus (Pagenstecher)

Mus (*Lemniscomys*) *barbarus* L. var. *massaicus* Pagenstecher, 1885, Jahrb. Hamburg. Wiss. Anstalt, **2**, p. 45: Lake Naivasha, Kenya Colony (restricted by Hollister, 1919).

2 ♂♂ (M.C.Z. 44184–5) Misuku Mtns. 23.ix–6.x.48.

Native name. *Usalamsanya* (Misuku).

Discussion. Externally these two specimens are indistinguishable from our long series of *massaicus* from various parts of Kenya and Uganda. The skulls also resemble closely in size and general proportions those of *massaicus*. Such cranial differences as do exist, as in the shape of the zygomatic plate and antorbital foramen, are too slight for taxonomic recognition.

Size. ♂. 120. 138. 24. 16 mm.

Diet. In the Misukus these zebra-rats eat bananas, cassava and potatoes.

Rhabdomys pumilio diminutus (Thomas)

Isomys pumilio diminutus Thomas, 1893, Proc. Zool. Soc. London for 1892, p. 551: Mianzini, east of Lake Naivasha, Kenya Colony.

Arvicanthis pumilio nyasae Wroughton, 1905, Ann. Mag. Nat. Hist. (7), **16**, p. 639: Mlanje Plateau, 6000 feet, Nyasaland.

4 ♂♂, 3 ♀♀, 2 yng. (M.C.Z. 43824–32) Nyika Plateau. 30.x–17.xi.48*
2 ♂♂ (M.C.Z. 43822–3) Lichenya Plateau. 13–16.viii.48.

Discussion. I can find no good characters separating the Lichenya (= Mlanje) Plateau topotype of *nyasae* from Kenya specimens of *diminutus*. Supposedly the former have shorter bullae than the latter; in the specimens at hand the reverse is actually true, although the difference is very slight. The original description of *nyasae* also implies that it is less fulvous than *diminutus*, a distinction that does not obtain in the Lichenya and Kenya specimens. The rather long series from the Nyika Plateau shows considerable variation in the amount of fulvous wash on the sides and shoulders, agreeing in this with the series from north of Lake Nyasa described by Allen & Loveridge (1933, p. 118). It is interesting to note that it is the more fulvous individuals from both of these places which match most closely the topotypes of the allegedly paler southern race.

Size. ♂ (M.C.Z. 43831), 122. 85. 20. 14 mm.; ♀ (M.C.Z. 43828), 155. 88. 21. 12 mm.

Breeding. On November 13 a nestling ♂, measured 75. 63. 17. 11 mm.; on the 17th a slightly larger ♀, 90. 76. 17. 12 mm.

Diet. One Lichenya four-striped grass-rat was trapped between 9.45 A.M. and 2.30 P.M. in a cupboard in the house with cheese bait. The animal's stomach held green and white mealy matter interspersed with vegetable fibres. Another, trapped in a copse close behind the house, was eaten except for its rump and tail probably by some other rodent. Many more were similarly lost in this way.

Habitat. As we overturned a charred log on the recently burnt-over Nyika Plateau, a rat ran from beneath and down its nearby burrow. The burrow extended in an almost straight line for a distance of about six feet from the entrance to the exit, and was at no point more than six inches below the surface, generally only from three to four inches.

OTOMYS

Northern Nyasaland is the meeting place for three very distinct species of *Otomys*. An attempt to trace their relationships has led to a rather detailed study of some of the other members of the genus. Certain early identifications have been revised in the light of additional material and two new species are herewith described. The high degree of variability in features that are usually good key characters in the Muridae has led to considerable diversity in the grouping of species of the Otomyinae. Early classifications of Wroughton (1906) and Dollman (1915a) placed considerable emphasis on the number of

laminae in the molars and the grooving of the incisors. In 1918 when Thomas subdivided the genus *Otomys*, he made it clear that, on a generic level, the shape of the skull was a better indicator of relationships than either of these characters. On a subgeneric level, he considered extra lamination of $M/_1$ as a good diagnostic character. A new subgenus, *Anchotomys* is then described for *Otomys anchietae*, a form with five laminae on $M/_1$. Subsequent studies by Allen & Loveridge (1933, p. 121) have shown that the four-laminated species *denti* and *kempi* belong in the same species group as *anchietae*, and the present work has brought to light a five-laminated form, externally very different from *Anchotomys*, which is probably intermediate towards the *tropicalis* group.

In addition to confirming Thomas' (1918, p. 204) opinion that general shape and proportions of the skull are the most reliable characters for grouping the species of this genus, the usefulness of certain other characters has been considered in detail. Of these, shape of the nasals, and of the rostrum in proportion to the cranium, in fully adult individuals has been found to be important. The appearance of this part of the skull changes considerably with age; further when different forms are compared it is found that young adult individuals differ far less than the old. In some cases the proportions of the zygomatic plate and arch are also useful characters. Size of the bullae and of the teeth varies within a species, while wear considerably changes the outline of the molars, particularly $M^3/$.

Externally, slight but consistent differences were found between the species in tail, feet and in general color pattern. Variation within a species was found in size of the ears and amount and color of the hairs lining them. This latter is to a certain extent an age variation also. In addition the feet usually become more grizzled with age, and in some forms the contrast between the dark-footed young adults and the gray-footed old individuals is very striking.

Otomys jacksoni Thomas

Otomys Jacksoni Thomas, 1891, Ann. Mag. Nat. Hist. (6), **7**, p. 304: [Crater of] Mt. Elgon, 13,000 feet.

Otomys angoniensis elassodon Allen & Lawrence (part), 1936, Bull. Mus. Comp. Zool., **79**, p. 106.

Discussion. Two specimens (M.C.Z. 31368 and 31370) from Kaburomi, Mt. Elgon, previously reported as *O. angoniensis elassodon*

(*loc. cit. supra*), are apparently rather pale representatives of *jacksoni*. The humped skull and double grooving of the lower incisors are characteristic, and cranial measurements are close to those given for the type. Externally these two individuals resemble closely topotypical specimens of *thomasi*, *t. squalus* and *orestes*, all of which have but a single groove on the lower incisors. As a group, which may be called the *jacksoni* group, all of these four forms have certain characters which easily distinguish them from the *tropicalis* group, a more widespread species occurring over at least part of the same general area. The former are softer furred with the general dorsal color a yellowish, rather than a reddish, brown. The undersurface is more evenly washed with buffy without well differentiated gray areas on the throat and inguinal region, pale post-auricular patches are present, and the feet are conspicuously buffy even in young individuals. Cranially, they may be distinguished chiefly by their strongly arched skull with the depth of the rostrum immediately behind the incisors less in proportion to the depth from the highest part of the orbit to the alveolar margin in front of $M^3/$. In addition, the auditory bullae are slightly larger and the zygomatic arch is more massive in proportion to the rest of the skull.

Descriptions of the double grooved forms, *Otomys percivali* and *O. dartmouthi*, indicate that these also belong to this same species group. *O. typus* from Abyssinia, although closely related to the *jacksoni* group, and very similar externally, differs cranially in its less arched skull, pale outer portion of the upper incisors and the anteroposterior compression of the last laminae of $M^3/$. As Thomas (1918, p. 204) has pointed out, the grooving of the lower incisors and the lamina formula of $M^3/$ in *Otomys* are highly plastic. In the widespread *tropicalis* group these vary among specimens collected at the same time in the same place, as for instance in our series of *O. tropicalis elgonis* from Sipi. Here there is considerable variation in the depth of the second groove on the lower incisor and three individuals have six instead of seven laminae on $M^3/$. In forms of the *jacksoni* group which has a discontinuous distribution, these characters have become more fixed. Thus, isolated colonies, while resembling each other closely in general cranial and external features, vary considerably in their dental pattern.

A series from the Uzungwe Mountains, previously identified as *percivali*, is apparently quite distinct and may be known as:

Otomys uzungwensis sp. nov.

Otomys percivali Allen & Loveridge (not of Dollman), 1933, Bull. Mus. Comp. Zool., **75**, p. 119.

Type. M.C.Z., No. 26645, an adult female skin and skull from Dabaga, Uzungwe Mountains, Iringa District, Tanganyika Territory. Collected by Arthur Loveridge, December 31, 1929.

Paratypes. M.C.Z. material examined, viz. skins and skulls of 4 ♂♂, 5 ♀♀, and skin only of 1 ♀ from Dabaga; skins and skulls of 2 ♂♂, 5 ♀♀ from Iringa in the Uzungwe Mtns.; also 2 ♀♀ (M.C.Z. 43947, 43950) Nyika Plateau. 4 & 17.xi.48.

Description. A rather aberrant form with certain of the cranial features of the *jacksoni* group as defined above, and an external resemblance to *O. angoniensis.*

General color above buffy brown, coarsely and heavily streaked with black. The subterminal rings of the hairs near "cinnamon buff", rump somewhat redder, sides somewhat paler and grayer. Conspicuous, whitish post-auricular patches are absent although a very few specimens have a minute patch of slightly paler hairs behind the ears. Around the eyes, the hairs lack gray bases so that the ochraceous subterminal bands form a more or less well-defined orbital ring of this color. The pale tips on the hairs of the belly are close to "pinkish buff", somewhat grayer on the throat and inguinal region. The tail is bicolored, dark above, buffy below, and the feet are rather evenly peppered with buffy and dark brownish hairs. Adults in the type series are very uniform in general color and two specimens from the Nyika Plateau show no significant differences. Younger specimens tend to be darker with a less contrasting rump, and have the first metatarsal darker than the rest of the foot. Compared with *O. angoniensis,* which occurs in much the same area, *uzungwensis* may be distinguished externally by its better defined orbital ring, grayer color, and slightly more contrasting rump.

Cranially, the double grooving of the lower incisors and small thickset skull with rounded dorsal profile and relatively heavy rostrum, are characteristic of this form. It differs from members of the *jacksoni* group in the flatter skull, the greater dorso-ventral depth of the rostrum in relation to the distance from the top of the orbit to the front of M^3/, and the differently shaped nasals. These are short, rather broad, and flattened as far forward as the moderately well-defined angle which sets off the expanded, downward curving anterior

half. From *O. typus,* it may be distinguished by its relatively heavy rostrum, well pigmented incisors, and the presence of only seven laminae on $M^3/$. Compared with *O. angoniensis,* skulls of *uzungwensis* may be told by their somewhat more delicate appearance with narrower interorbital region and far more slender rostrum. The nasals, even in old individuals, are not inflated.

Measurements. Measurements in millimetres of four full grown adults are given, those of two ♀♀ (the type and M.C.Z. 26643) followed by those of two ♂♂ (M.C.Z. 26638 and 26646).

Field measurements: head and body 155, 160, 180, 195; tail 80, 80, 60 (apparently broken and healed), 90; hind foot 26, 25, 25, 25; ear 25, 25, 25, 20 mm.

Skull measurements: greatest length 38.8, 38.4, 38.9, 38.9; condylobasal length 36.7, 35.3, 36.6, br.; palatal length 20.6, 19.5, 20.0, 20.7; zygomatic width 19.1, br., 18.8, 18.8; mastoid width 12.9, 12.1, br., br.; interorbital width 4.0, 4.1, 4.1, 4.4; width outside molars 7.1, 7.2, 7.1, 7.4; nasals 18.5 x 7.3, 16.8 x 7.4, 17.6 x 7.5, 17.8 x 7.4; length of nasals is difficult to take accurately as the nasofrontal suture is often obliterated, particularly in old animals; for this reason length of rostrum was also measured on a line from the posterior margin of the antorbital foramen to the tip of the nasals; length of rostrum 13.8, 13.1, 13.9, 13.1; alveolar length of upper cheek teeth 9.2, 9.5, 9.4, 9.4; depth from highest point of orbit to front of $M^3/$ 13.0, 12.3, 12.7, 12.5 mm.

Discussion. The type series was originally identified as *percivali,* a species with two well-marked grooves on the lower incisors, similar, but brighter, coloring, and creamy white post-auricular patches. The study of additional material now shows that *uzungwensis* has a much flatter skull and is a smaller, less brightly colored animal lacking the pale post-auricular patches which are such a conspicuous feature of *percivali.*

While *uzungwensis* is apparently most closely related to the *jacksoni* group, it is interesting to note that the rather heavy rostrum and broad nasals of this southern species suggests *angoniensis,* while the slenderer rostrum and nasals of the northern forms of this group are reminiscent of the species *tropicalis,* itself a northern form. This may be evidence that two, widespread, rather plastic species, *angoniensis* and *tropicalis,* are gradually encroaching upon, and to a certain extent breeding with, the less plastic members of an older, *jacksoni,* group.

Parasites. A larval tick (*Ixodes* sp.) was preserved from one of the Nyika paratypes (M.C.Z. 43950).

Otomys barbouri sp. nov.

Otomys tropicalis elongis Allen & Lawrence (part, not of Wroughton), 1936, Bull. Mus. Comp. Zool., **79**, p. 106: Kaburomi and Madangi material only.

Otomys angoniensis elassodon Allen & Lawrence (part, not of Osgood), 1936, Bull. Mus. Comp. Zool., **79**, p. 106: most, but not all, of the Kaburomi series.

Type. M.C.Z., No. 31369, an adult male skin and skull from Kaburomi, 1°14′ N., 34°31′ E., 10,500 feet, Mount Elgon, Uganda. Collected by Arthur Loveridge, December 28, 1933.

Paratypes. M.C.Z. material examined, viz. Nos. 31371–2, 31421–5, 31438, being skins and skulls of 4 ♂♂, 3 ♀♀ and one unsexed specimen from Kaburomi (with same data as the type); also M.C.Z. No. 31376, a ♀ skin and skull from Madangi, Mount Elgon, Uganda. All collected by Arthur Loveridge.

Description. The pale belly, grizzled feet, and rather short bicolored tail, in combination with five laminae on $M/_1$, readily distinguish this species.

General color over the whole dorsal surface is dull reddish brown evenly and finely mixed with blackish; sides slightly paler, the stiffened hairs on cheeks and sides of the neck markedly so. The subterminal rings of the hairs are near "ochraceous buff". The ventral surface is conspicuously paler than the dorsal, the tips of the rather long hairs being near "light buff", the throat and inguinal region slightly grayer.

Compared with *tropicalis elgonis*, also found on Mt. Elgon, *barbouri* may be distinguished externally by its less reddish color, paler belly, longer, softer fur, evenly speckled feet, gray, rather than dark brown, wrists, and the suggestion of an ochraceous orbital ring. It differs from *jacksoni* chiefly in its larger size, longer, grizzled rather than ochraceous, hind feet, in the absence of a pale postauricular patch and in the grayish color of the inguinal and throat region.

Cranially, the presence of five lamina on $M/_1$ and seven on $M^3/$, and the absence of a second groove on the lower incisors readily distinguish this new form. The skull is long and flattened with the interorbital region strongly pinched in, particularly posteriorly, the anterior half of the nasals is scarcely bent down and moderately broad

with a distinct angle at the transition from broad to narrow parts. The sides of this broad portion are evenly curved downward so that, in dorsal view, the end of the rostrum looks parallel sided and almost tubular. The zygomatic arch is abruptly expanded, bending the antorbital plate sharply outward, and the greatest zygomatic width is often anterior.

Measurements. Measurements in millimetres of four full grown adults are given, those of two ♂♂ (the type and M.C.Z. 31422) followed by those of two ♀ ♀ (M.C.Z. 31421 and 31423).

Field measurements: head and body 185, 190, 160, 168; tail 89, 83, 60 (apparently broken and healed), 76; hind foot 26, 27, 21, 26; ear 19, 20, 21, 23 mm.

Skull measurements: greatest length 38.4, 37.8, 39.6, 37.6; condylobasal length 37.6, 36.4, 38.4, 35.9; palatal length 20.7, 20.2, 21.9, 20.3; zygomatic width 19.0, br., br., 17.9; mastoid width 13.6, 13.9, 13.4, 12.2; interorbital width 4.3, 4.2, 3.8, 4.1; width outside molars 7.2, 7.3, 7.2, 7.1; nasals 15.8 x 7.0, 16.4 x 6.9, 17.2 x br., 16.1 x 6.7; length of rostrum taken as in *uzungwensis* 12.7, 12.6, 13.8, 12.7; alveolar length of upper cheek teeth 9.2, 9.2, 9.6, 9.3; depth from highest point of orbit to front of M^3/ 12.7, 12.6, 13.8, 12.7 mm.

Discussion. This very peculiar species has been found only in the alpine meadow zone of Mt. Elgon where *O. jacksoni* also occurs. The two have a certain superficial resemblance in color and character of the fur, although cranially they are entirely distinct.

In outline and proportions of the skull as well as in lamina formula *O. barbouri* closely resembles *Anchotomys*. It differs chiefly in the shape of the nasals which, in the latter, are less abruptly expanded and flatter transversely. Externally *barbouri* differs more from *Anchotomys* than do some of the dark races of *tropicalis*. The occurrence of a species which is somewhat intermediate between *Anchotomys* and the *tropicalis* group is not surprising as the two resemble each other in many ways. Their chief cranial difference lies in the rather curved dorsal profile and smaller interparietal of the latter. Otherwise the skulls are very similar. Externally the difference is even less. Specimens of *tropicalis elgonis* are almost as dark as topotypes of *denti*, the feet are identical in color, the tail is only slightly shorter and indistinctly bicolor, and the belly paler than the back only in throat and inguinal region.

It is a pleasure to name this form for the late Thomas Barbour,

whose contagious enthusiasm for the world around him made the study of natural history an absorbing and fascinating task.

Otomys kempi Dollman

Otomys kempi Dollman, 1915, Ann. Mag. Nat. Hist. (8), **15**, p. 152: Burunga, 6000 feet, Mt. Mikeno, Belgian Congo.

1 ♂, 1 ♀, 1 yng. (M.C.Z. 43948–9, 43966) Nyika Plateau. 1–5.xi.48.

Discussion. These three specimens resemble very closely the series of *kempi* previously reported (Allen & Loveridge, 1927, p. 437) from the Uluguru Mountains, Tanganyika Territory. Externally the very dark color with scarcely contrasting belly, blackish undersurface of the tail, and scantily haired, dark feet readily distinguish this species from its neighbors. The skulls of both series are characterized by their flat dorsal profile, long, parallel-sided interorbital region, the lateral compression of the expanded portion of the nasals, and the rather slender zygomatic arch. There is a single groove on the lower incisors, four laminae on $M/_1$, and six laminae on $M^3/$. The bullae of the Uluguru series are small, those of the Nyika individuals are slightly more inflated. This southwesterly extension of the range of *kempi* is of great interest, indicating as it does that the species spread south from the Kivu region and then northeasterly as far as the Uluguru Mountains. It may even have reached the Usambara Mountains, if *Otomys denti sungae* actually is conspecific as the author supposes — in spite of its paler belly, bicolored tail, and the double grooves on the lower incisors.

The close relationship of *denti* and *kempi* with *anchietae* has been discussed by Allen & Loveridge (1933, p. 121) who supposed that the two former were northern representatives, and the latter a southern, of a dark Congo basin form. The Nyasaland records indicate that the eastward spread of the Angolan species, as shown by the distribution of *anchietae lacustris*, has cut across the southern extension of the northern form, apparently isolating the Uluguru colony. The extraordinary plasticity of the genus and the tendency of isolated colonies of other species to develop peculiar local characteristics, makes it all the more surprising to find no significant differences between these two widely separated populations of *kempi*.

Enemies. Remains of *Otomys*, either this species or *uzungwensis*, were present in the stomachs of a harrier (*Circus macrourus*) and grass owl (*Tyto c. capensis*), and formed the bulk of a leopard's feces.

Otomys angoniensis angoniensis Wroughton

Otomys irroratus angoniensis Wroughton, 1906, Ann. Mag. Nat. Hist. (7), **18**, p. 274: M'Kombhuie, Angoniland, Nyasaland.

Otomys irroratus nyikae, Wroughton, 1906, Ann. Mag. Nat. Hist., (7), **18**, p. 276: Nyika Plateau, Nyasaland.

2 ♂♂, 4 ♀♀, 4 yng. (M.C.Z. 43952–7, 43967–701) Misuku Mtns. 24.ix–15.x.48.
1 ♂, 1 yng. (M.C.Z. 43946, 43965) Nchenachena. 20.xi.48.
♂ (M.C.Z. 43951) Vipya Plateau. 18.ix.48.
2 ♂♂, 2 ♀♀, 3 yng. (M.C.Z. 43958–61, 43971–3) Zomba Plateau. 2–8.ix.48.
♂ yng. (M.C.Z. 44176) Cholo Mtn. 11.iii.49.
1 ♂, 1 ♀, 1 yng. (M.C.Z. 43962–4) Lichenya Plateau. 12–21.viii.48.

Native names. Mende (Ngoni); *ngusuka* (Misuku); *tiri* (Manganja and Nguru).

Type Locality. With regard to the locality "M'Khombuie, Angoniland," Loveridge suggested it was possibly a variant of Whyte's locality in the Misuku Mountains which has been spelled variously "Kombe, Kombi, and Kekombe," as in earlier days the Angoni ranged widely over the country. We appealed to Mr. C. W. Benson, the District Commissioner and ornithologist, who at one time or another has served in most of the area concerned. The gist of his reply, written on March 16, 1950, was as follows:

"I consider it most unlikely that 'M'Kombwe, Angoniland' is in the Misuku Mountains. There are certainly no Angoni there today and I do not think they ever penetrated the Misuku, even though it is known that the ancestors of the Angoni now living in Mzimba District did go as far north as the south end of Lake Tanganyika. I have read much of the early history of what is now the Karonga District and though the Angoni did visit the Karonga lake littoral there is no record of them entering the Misuku country. Furthermore, travellers and collectors in Nyasaland in the nineties of the last century and the first decade of the present one would never have referred to the Misuku area as in Angoniland.

"There are two Angonilands in Nyasaland:— (a) North Angoniland, consisting chiefly of all the Vipya country as far north as Njakwa, and as far south as about 12°45′. (b) South Angoniland embracing the greater part of the Dedza and Ncheu Districts. I have been enquiring in Dedza and find there is a Kombe village about 15 miles N.N.E. of Dedza boma at an altitude of 5,000 feet. There is also a Khombe village near the shore of Lake Nyasa, about 25 miles N.E. of Dedza

boma and 1600 feet a.s.l. Both villages are said to have been already settled in approximately these positions by 1900."

Discussion. In 1906 Wroughton described two races of *Otomys* from Nyasaland, *irroratus angoniensis*, a southern form from M'Kombhuie, Angoniland (see the above discussion of the type locality), and *i. nyikae*, a northern one from the Nyika Plateau. He gave as diagnostic characters of the latter the "extraordinary broad, flat, spatulate nasals," differentiating it further on the basis of its shorter hind foot and smaller bullae. Dollman (1915a, p. 165) further says that *nyikae* is a rather smaller animal, and gives each specific rank, although he believes them to be closely related, and indicates that the ranges are not overlapping. Of our series, the smallest is a specimen from Lichenya Plateau at the extreme south, the largest a near topotype of *nyikae* from the lower slopes of that mountain, while specimens from Zomba in the south resemble most closely those from the Misuku Mountains in the north. Zomba and Lichenya are rather close together geographically. The former, according to Dollman (1915a, p. 163), is within the range of typical *angoniensis*.

The largest of our series from Zomba, an old individual with strongly ridged skull, agrees closely with Wroughton's description and Dollman's (1915a, p. 163) further account of the type. It differs only in its slightly smaller size, length of skull 40.8 mm. instead of 42.0 mm., and shorter nasals, 17.7 mm. long and 8.9 mm. wide as against 19.7 mm. long and 8.9 mm. wide. The specimen from Nyika is even closer to *angoniensis* in cranial measurements with the large hindfeet of this form. The nasals, although broader than in *angoniensis*, being 9.6 mm. wide, are strongly inflated on each side of the mid-line, instead of flattened as described for *nyikae*, and the bullae are not significantly smaller than those of our southern specimens. The broken skull of an *Otomys* from the near-by Vipya Plateau is almost as large with slightly narrower, but otherwise similar, nasals. Width and inflation of the nasals increases tremendously with age in these *Otomys*. The parietal ridges develop early so that young skulls have a deceptively full grown appearance. Of our series of fourteen adults three have probably reached maximum size and resemble each other as noted above. Comparing the others within their age group, such differences as were found were very slight and cut across any division into northern and southern races.

Apparently we are dealing with a widespread species which tends to form well defined local populations and in which adjacent populations

often differ more from each other than they do from more distant groups. In this connection it is interesting to note that two specimens from the Uzungwe Mountains (Allen & Loveridge, 1933, p. 119) resemble a series of *angoniensis classodon* from Nairobi more closely than they do typical *angoniensis*. The point is further illustrated by the apparently random, but not overlapping, distribution of *angoniensis classodon* and *nyikae canescens* as plotted from identifications by Osgood, Hollister, Dollman and Allen. The type localities of these forms are within a very few miles of each other and the type series certainly show the characters described by Osgood. For this reason it has generally been assumed that two species of broad-nosed *Otomys* occur over the same general area in East Africa.

Enough material has now been accumulated to show that the situation is rather different. In series which I have examined from Molo, Lake Elementeita, Gilgil, Naivasha, Kijabe, Nairobi and the Fort Hall region, the supposed specific characters are overlapping. Further, comparison of long series from Kenya Colony with series from Nyasaland shows that all of the northern specimens resemble each other more closely than any of them resemble the southern ones. These latter tend to be somewhat smaller with proportionately shorter, broader rostra, and more heavily ridged skulls, while the shape of the nasals is conspicuously different. In old individuals of typical *angoniensis* the nasals are very broad and separately inflated with a median sulcus along the internasal suture. In the northern form they are narrower, tend to be domed in the mid-line at the point where the anterior portion is bent downward, and the internasal sulcus is usually absent.

Apparently, instead of having two species, *angoniensis* and *nyikae*, each with northern and southern races, there is a single very distinct species, *angoniensis*, with an as yet undeterminable number of races. This species differs from the *Anchotomys* and *jacksoni* groups, with which it shares some of its range, in a number of ways. Externally the harsher, rather coarsely streaked, fur is characteristic. Cranially the greater development of the rostrum is the most conspicuous feature. The incisors are heavy, the trumpet-shaped nasals broadly expanded, and the antorbital plate is wide. In profile the skull is deep dorsoventrally so that an extension of the alveolar margin falls below the bullae, and the development of the interorbital ridges gives it a slightly arched appearance.

BATHYERGIDAE

Cryptomys hottentotus whytei (Thomas)

Georychus whytei Thomas, 1897, Proc. Zool. Soc. London, p. 432: Karonga, Lake Nyasa, Nyasaland.

5 ♂♂, 2 ♀♀, 1 yng. (M.C.Z. 43797–802, 43814, 44245) Misuku Mtns. 1–13.x.48.

Native name. *Tunco* (Misuku).

Discussion. This series is very uniform in color. Compared with the specimens of *whytei* from the Rungwe and Poroto Mountains described by Allen and Loveridge (1933, p. 124) they average slightly darker on the ventral surface, and the degree of taper of the ends of the nasals is a little more variable. Otherwise these Misuku blesmols closely resemble those from the mountains to the north of Lake Nyasa.

Size. ♂. 152. 24. 24. 0 mm.; ♀. 145. 19. 22. 0 mm.

Breeding. On October 6 a nestling ♂ measured only 65. 8. 8. 0 mm.

Heliophobius argenteocinereus argenteocinereus Peters

Heliophobius argenteocinereus Peters, 1846, Ber. über Verhandl. K. Preuss. Akad. Wiss. Berlin, p. 259: Tete, Mozambique.

4 ♂♂ (M.C.Z. 43813, 43917–9) Mtimbuka. 14–28.ii.49.

Native name. *Uko* (Yao).

Discussion. This series from near Fort Johnston averages slightly smaller, both cranially and externally, than *angonicus*. Of three unbroken skulls, one has the relatively parallel-sided interorbital region (width across postorbital processes 8.7; interorbital width 8.2 mm.) said by Thomas (1895, p. 241) to be typical of *argenteocinereus*. The others have a more pronounced interorbital constriction, and are comparable in these dimensions to the narrowest of the Nchisi specimens (width across postorbital processes 9.9 and 9.5 mm.; interorbital width 7.6 and 7.8 mm.). The most striking external difference between the Mtimbuka series and *angonicus* is the uniformity in color of the former from young to old. Adult, young adult, and young are all represented, and all have the same rather long "fawn" colored tips to the hairs. In the case of the two youngest this is in sharp contrast to the slaty young of the higher altitude race, *angonicus*.

Rodney C. Wood found *Heliophobius* common in the hills near Cholo and Chiromo, and Kershaw (1922, p. 192) identified Wood's series as typical *argenteocinereus*. The series at hand, however, seems to show

that the Cholo animal is not separable from *angonicus*, but that a very distinct race does occur at Fort Johnston, to which the name *argenteocinereus* probably should be applied.

Size. ♂ (M.C.Z. 43917), 152. 14. 30. 0 mm.

Heliophobius argenteocinereus angonicus Thomas

Heliophobius angonicus Thomas, 1917, Ann. Mag. Nat. Hist. (8), **20**, p. 314: Bua River, Central Angoniland, Nyasaland (Moreau et al, 1946, p. 428).

3 ♀♀ (M.C.Z. 43795–6, 43815) Nyika Plateau. 9–17.xi.48.
5 yng. ♂♂, 12 ♀♀ (M.C.Z. 43784–94, 43816–21) Nchisi Mtn. 26.xi–13.xii.48.
♀ (M.C.Z. 43783) Zomba Plateau. 10.xi.48.
♂ (M.C.Z. 43812) Ruo R., Mlanje Mtn. 1.iv.49.
2 ♂♂, 4 ♀♀, 2 ? (M.C.Z. 43803–8, 43810–1) Cholo Mtn. 11–23.iii.49.

Native names. Fuko (Chewa; Ngoni; Nyanja); *namfuko* (Manganja at Cholo; definitely not *nanfuko* as given by Rodney Wood).

Discussion. Until Thomas described *angonicus*, specimens of *Heliophobius* from Nyasaland were generally considered identical with *argenteocinereus* from Tete. In 1917, Thomas separated the central Nyasa and northeastern Rhodesian form from *argenteocinereus* chiefly on the basis of its greater frontal breadth and the greater development of the postorbital processes. Our series from Nchisi Mtn. comes from slightly southeast of the type locality of *angonicus* and averages close to the measurements given by Thomas for this race. The largest has an interorbital breadth of 9.3 mm. and a breadth across the postorbital processes of 11.8 mm. as against 9.4 and 12.4 mm. in the type. Old individuals are, of course, broadest, while two young adults vary in interorbital breadth from 7.6 to 8.3 mm., and in breadth across the postorbital processes from 9.6 to 11.4 mm. Our series from the southern highlands are not appreciably narrower, and the width across the postorbital processes averages close to that of the Nchisi series. The largest specimen from Cholo has an interorbital breadth of 10.5 mm. and is 11.8 mm. across the postorbital processes.

Only one blesmol, an adult ♀ from Nchisi, has the vertical ridge on the occiput mentioned by Thomas as occurring in all three of his adult *angonicus*. This skull is further peculiar in that the root of the right incisor does not extend beyond the molar tooth row although the left is perfectly normal in this respect. The two oldest of the Nyika animals are remarkable in having only three molariform teeth in place in the upper jaw, fewer than in any of the more southerly specimens

of comparable age. The bullae also are slightly larger and project somewhat farther posteriorly than in the southern animals.

The palest of the Nchisi series has the tips of the hairs washed with "avellaneous", the darkest, with "fawn color." The range of variation is about the same for the Cholo series. Occasional individuals in each of the series have a white spot on the head, none has white markings on the belly. Young individuals from Nchisi and Cholo have rather plushy dark gray fur; in older ones the fur becomes silkier with brownish tips which are at first short and rather dark, then gradually become paler. A series of three individuals from the Nyika differs from the others in apparently retaining till a considerably older age the dark plushy fur usually characteristic of the young. Furthermore, two of the Nyika series have conspicuous, irregular, white blotches on the belly.

An adult skull of one of these with the locality label lost has no molariform teeth at all in the lower jaw, while those of the upper jaw are very long and curved outward so sharply that any chewing or grinding was done between the inner surface of the upper teeth and the toothless upper margin of the lower jaw. Of the ten that are in place, only the two first ones in each row are worn at the tips, indicating that at one time they were opposed by teeth in the lower jaw. The anteriormost on each side is thickly encrusted with a deposit which more than doubles its diameter at the tip.

Size. ♂ (M.C.Z. 43795), 160. 21. 31. 0 mm.; ♀ (M.C.Z. 43820), 180. 17. 35. 0 mm.

Parasites. The fur of a young Nchisi blesmol was swarming with mites (preserved).

Enemies. Fur, apparently of this species, was present in the stomach of a jackal (*Thos a. adustus*) shot on the Nyika. A blesmol was brought to our Likabula River camp but I refused to buy the poor creature as its front teeth had been broken off by the captor. Another native remarked that unless they were allowed to break the teeth the local people were so afraid of being bitten that they would not bring me these rodents. In many districts blesmols are eaten by the Africans.

LEPORIDAE

Lepus ?whytei Thomas

Lepus whytei Thomas, 1894, Proc. Zool. Soc. London, p. 142: Palombi River, Shirwa Plain, [i.e. Palombe River, Chilwa Plain], Nyasaland.

4 yng. (M.C.Z. 44123–6) near Tete, M. 10–24.i.49.

Native name. *Sulu* (Nyungwe).

Discussion. In the absence of adults these four leverets are only tentatively referred to this form, being too young for positive identification.

Size. ♂. 195. 30. 52. 44 mm.; ♀. 182. 40. 51. 50 mm.

PROCAVIIDAE

Heterohyrax syriacus manningi (Wroughton)

Procavia brucei manningi Wroughton, 1910, Ann. Mag. Nat. Hist. (8), **5**, p. 109: Mlanji, [i.e. Mlanje], Nyasaland.

♂ (M.C.Z. 44156) Chiradzulu Mtn. 27.viii.48.
yng. ♂ (M.C.Z. 44154) Cholo Mtn. 14.iii.49.
♀ (M.C.Z. 44155) Chambe Plateau. 20.viii.48.

Native names. *Mbela* (Chewa; Ngoni; Nyanja; Manganja).

Discussion. The topotype from Chambe Plateau, Mlanje Mtn., is smaller than Wroughton's two specimens but otherwise does not appear to differ. The young ♂ from Chiradzulu (in stage IV) shows the paler, browner color described for young animals of this species.

Size. ♂. 410. 0. 59. 30 mm.; ♀. 457. 0. 65. 30 mm.

Breeding. The ♀ held two fetuses (preserved) near birth.

Diet. Stomachs were crammed with green leaves.

Parasites. Surprisingly enough the stomachs appeared to be free of parasites, but lice and a tick were preserved from the topotype.

Habitat. The topotype was shot on the moss-grown rocks of a ravine deep in cedar forest rendered accessible by a path that had recently been cut for the removal of timber. A hundred yards away I shot a bigger hyrax which both guide and gunbearers declared was a larger species (? *Procavia j. johnstoni*, also described from Mlanje Mtn.). Unhappily it rolled down a sloping rock into a cavern from which it could not be recovered. At night, hyrax were frequently heard calling on Lichenya Plateau. They are said to occur on the precipitous rock-face of the escarpment below Chingwe's Hole on Zomba Mtn., a location where they are free from molestation by man.

SUIDAE

Potamochoerus porcus ?nyasae Major

Potamochoerus choeropotamus nyasae Major, 1897, Proc. Zool. Soc. London, p. 367, pl. xxv, fig. 3; pl. xxvi, fig. 4: Zomba, Nyasaland.

Skull only (M.C.Z. 44307) Nchisi Mtn. 1947.

2 yng. (M.C.Z. 43889–90) near Tete, M. 14–17.i.49.

Native name. *Kumba* (Nyungwe).

Discussion. The material is such that positive identification is not possible although the skull resembles rather closely Major's figure of *nyasae*.

Size. ♂ yng. 340. 115. 80. 58 mm.; ♀ yng. 350. 115. 80. 50 mm.

Habitat. The skull is from a specimen shot in Nchisi Forest by Guy Muldoon. A pair of fullgrown wild pigs appeared at dawn on the edge of Matipa Forest, Misuku Mountains, close to our camp.

BOVIDAE

Cephalophus harveyi harveyi Thomas

Cephalophus harveyi Thomas, 1893, Ann. Mag. Nat. Hist. (6), **11**, p. 48: Kahe Forest, s.e. foot Kilimanjaro Mtn., Tanganyika Territory.

♀ (M.C.Z. 44308) Nyika Plateau. 8.xi.48.

Discussion. This fine adult skin and skull confirm Miss St. Leger's (1936, p. 218) opinion as to the subspecific identity of the Nyasaland form. Her opinion was based on a skin without a skull from Nkata Bay, a locality slightly southeast of the Nyika Plateau from whence comes our animal.

Size. ♀. 800 ? (as body removed), 115. 190. 75 mm.

Sylvicapra grimmia altifrons (Peters)

Antilope altifrons Peters, 1852, Reise nach Mossambique, Säugeth., p. 184, pls. xxxvii–xxxviii: Boror and Sena, Mozambique.

Antilope ocularis Peters, 1852, Reise nach Mossambique, Säugeth., p. 186, pl. xxxix; pl. xli, fig. 1; pl. xlii, fig. 1: Boror; Macanga; Sena; and Tete, Mozambique.

♀ (M.C.Z. 44314) Nyika Plateau. 1.xi.48.
2 ♂♂, 1 ♀ (M.C.Z. 44310–1, –13) Nchisi Mtn. 27.xi.–3.xii.48.
♀ (M.C.Z. 44312) Chitala River. 16.xii.48.
1 yng. ♂, 2 yng. ♀ ♀ (M.C.Z. 43885–7) near Tete, M. 6–26.i.49.

Native names. *Insha* (Chewa); *ngwapi* (Ngoni); *nyasa* (Nyungwe).

Discussion. This series clearly belongs to the southern long-eared section of *grimmia*, not to the short-eared section represented by *shirensis*. We have followed Wroughton (1910, p. 274) in considering the Nyasaland form to be the same as that from Tete. The Nchisi animals differ from the others in having more conspicuous white markings around the eyes and the bases of the ears. Further, one of them, although otherwise indistinguishable from the rest, has very

much larger bullae: length from top of meatus to bottom of bulla 35.5 mm. as against 30.3 and 30.5 mm. The external ear measurements are respectively 110, 110 and 118 mm. The three juvenile topotypes of *ocularis* are too young to show adult characters.

Size. ♂. 950. 130. 245. 118 mm.; ♀ (M.C.Z. 44314), 1010. 135. 250. 110 mm.; ♂ yng. 490. 80. 170. 88 mm.; ♀ yng. 470. 60. 167. 90 mm.

Breeding. On December 16 a ♀ held a large fetus.

Parasites. Nematodes (*Setaria* sp.) were preserved from stomachs of two Nchisi duiker.

Oreotragus oreotragus centralis Hinton

Oreotragus oreotragus centralis Hinton, 1921, Ann. Mag. Nat. Hist. (9), **8**, p. 131: South Chinsali district, northeastern Rhodesia.

♂ (M.C.Z. 44293) 15 miles NW. of Fort Hill.

Discussion. The bright ochraceous coloring of the anterior parts contrasts strongly with the gray rump and thighs. On the shoulders, and the sides immediately behind the shoulders, the color is deepest, and is further accentuated by the absence of well-defined, subterminal, black rings on the hairs. In front of the eyes are patches of white-based, buffy-tipped hairs which contrast with the rest of the face and suggest the conspicuous white preorbital patches which are characteristic of the more easterly race *aceratos*, and lacking in *centralis*.

Remarks. This museum skin was presented by C. W. Benson, Esq. as Loveridge met with klipspringers only on the rock-strewn sides of Nchisi Mountain, and failed to secure any.

Raphicerus sharpei ?sharpei Thomas

Raphiceros sharpei Thomas, 1897, Proc. Zool. Soc. London, for 1896, p. 796, pl. xxxix: Southern Angoniland, Nyasaland.

yng. (M.C.Z. 44292) Nthalire, Karonga District. 27.iv.47.
yng. ♀ (M.C.Z. 43888) near Tete, M. 6.i.49.

Native name. Kasenyi (Nyungwe).

Discussion. Both of these steinbok probably belong to this race although they are too young for positive identification, and the dark marking on the head is more extensive than described and figured by Thomas in the type.

Size. juv. ♀. 460. 40. 140. 78 mm.

Remarks. The Nthalire specimen was presented by C. W. Benson,

Esq., while the other was brought in alive, indicating that the young are dropped in Zambezia in early January.

Redunca arundinum arundinum (Boddaert)

Antilope arundinum Boddaert, 1785, Elenchus Animalium, p. 141: Cape of Good Hope.

♀ & fetal ♀ (M.C.Z. 44294, 44309) Vipya Plateau. 18.ix.48.

Native names. *Mpoyo* (Timbuka); *shangu* (Ngoni).

Discussion. The adult is rather more strongly fulvous than the average of our series of this race from southern Tanganyika and the Transvaal.

Size. ♀. 1550. 270. 400. 163 mm.; fetal ♀. 540. 100. 210. 80 mm.

Breeding. The gravid ♀ was shot from a party of three does accompanying a buck. On the Nyika only solitary reedbuck were seen in November and they were uncommon and excessively timid.

Strepsiceros strepsiceros strepsiceros (Pallas)

Antilope strepsiceros Pallas, 1766, Miscellanea Zool., p. 9; 1767, Spicilegia Zool., pt. 1, p. 17; 1777, pt. 12, pp. 19, 67: Cape of Good Hope.

♀ (M.C.Z. 44306) near Tete, M. 20.i.49.

Native name. *Ngoma* (Nyungwe).

Discussion. This adult ♀ clearly belongs to the typical southern subspecies rather than to the grayer race *frommi* of southern Tanganyika.

Size. ♀. 1300. 360. 500. 222 mm.

Habitat. Not infrequently we came on fairly fresh spoor of small parties of Greater Kudu in the low hills to the south of Kasumbadedza. Apparently it was one of these animals that had been harried by a native huntsman and his dogs and driven into the Zambezi. She was a third of the way across when I first saw her swimming strongly despite the current and the sinister snouts of several watchful crocodiles. Later, followed by three crocodiles, she returned to shallow water but was prevented from landing on Mwanza rocks by the vociferously barking collection of curs gathered on the narrow foreshore. She was killed instantly with a bullet through the brain.

Tragelaphus scriptus ornatus Pocock

Tragelaphus scriptus ornatus Pocock, 1900, Ann. Mag. Nat. Hist. (7), **5**, p. 94: Linyante, swamps of the Chobi, between Lake Ngami and the Zambezi, northern Bechuanaland.

♀ (M.C.Z. 44315) Lichenya Plateau. 9.viii.48.

Native name. *Mbawala* (Chewa; Ngoni; Nyanja; Yao).

Discussion. This specimen differs from *s. massaicus* to the north by its brighter, richer coloring, more numerous spots on the flanks and along the belly, and in the presence of eight obsolescent transverse stripes.

Size. ♀. 1180. 95. 290. 115 mm.

Breeding. She held a fetus (preserved) measuring about 105. 14. 45. ? 25 mm.

Remarks. This bushbuck was shot at the edge of a large coppice at 7:00 A.M. When we went to pick her up there was a noise in the bushes thirty feet away as if another animal was making off. At noon we disturbed a pair feeding on the outskirts of a patch of closed forest beyond Chingwe's Hole, Zomba Plateau.

Taurotragus oryx livingstonii (Sclater)

Oreas livingstonii P. L. Sclater, 1864, Proc. Zool. Soc. London, p. 105: Left bank of the Zambezi near the Kafue, Rhodesia.

♀ (M.C.Z. 44303) Nyika Plateau. 11.xi.48.

Native name. *Nchefu* (Ngoni).

Size. ♀. 2800. 620. 520. 160 mm.

Parasites. Bots from the stomach were preserved.

Habits. This fine animal was leading a herd of about 25 eland in which there were two bulls. The day before I had sighted a herd numbering about 80 or 85 animals, irrespective of a dozen zebras which seem to accompany every herd of eland on the plateau. Doubtless the eland derive additional protection from the zebras' habit of grazing along the skyline.

EQUIDAE

Equus burchelli crawshaii de Winton

Equus burchelli crawshaii de Winton, 1896, Ann. Mag. Nat. Hist. (6), **17**, p. 319: Henga, highlands west of Lake Nyasa, Nyasaland.

♂ ♀ (M.C.Z. 44304–5) Henga Highlands, Nyika Plateau. 3 & 9.xi.48.

Native name. *Mbidzi* (Ngoni).

Discussion. Cabrera (1936), in his excellent review of the Burchell zebras, discusses in detail the tremendous amount of individual variation in this group and concludes that only four of the many described forms represent valid races. He further makes *crawshaii*, of which our two specimens are topotypical, a synonym of the East African form *böhmi*, stating in part:

> "specimens mentioned under that name [*crawshaii*] in some cases are identical with the latter form [*böhmi*], and in others belong to the narrow-striped Zambesian race for which *selousi* seems to be the valid name."

Antonius (1951, p. 21) follows him in considering *crawshaii* to be a synonym of *böhmi* but recognizes *foai* Prazak and Trouessart from the lower Zambezi as a distinct race, intervening between *selousi* in the south and *böhmi* in the north.

The pair of topotypes at hand show the situation to be somewhat different. As Miss St. Leger (1932b, p. 590) supposed, the northern Nyasaland zebra is not the same as the East African *böhmi*, the numerous narrow stripes in our Henga specimens show that it is more closely related to *selousi*. Supposing Antonius is correct in assuming the distinctness of a Zambesian race, our material is inadequate to show whether it differs from *crawshaii*. The evidence suggests that the two are the same, in which case *crawshaii*, 1896 takes precedence over *foai*, 1899.

Size. ♂. 2400. 450. 430. 190 mm.; ♀. 2410. 400. 425. 180 mm.

Breeding. On November 9 a well-grown foal was running with the two mares accompanying the stallion when he was shot. Two days later a lone roan antelope (which I had frequently seen on the plateau) attached himself to the little party and remained with them for at least a week.

Parasites. Some worms (*Cylicocercus alveatus; Cylicocylus insignis;* and *Cylindropharynx* sp., probably *intermedia*) were identified by Dr. J. T. Lucker.

Habitat. Crawshay's zebras were not plentiful, but by no means uncommon, on the corner of the Nyika Plateau on which we were camping. Small parties of zebra accompanied the wandering herds of eland while others seemed to keep much to themselves; all were remarkably wary.

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PLATES

PLATE 1

Map showing Principal Collecting Localities

1948

Landing at Beira, Mozambique (17–19.vii), Loveridge proceeded by rail to Blantyre, Nyasaland (20–26.vii). Thence by truck to Likabula River (26.vii–6.viii) at foot of Mlanje Mtn., which was ascended to Lichenya Plateau (6–23.viii) with side trip to Chambe Plateau (20.viii). Thereafter Chiradzulu Mtn. (25.viii–1.ix); Zomba Plateau (1–13.ix); Dedza (13–14.ix); Kasungu Boma (14–15.ix); Mzimba Rest House (15–16.ix); Macdonald's Camp, Vipya Plateau (16–20.ix); Katumbi (20–21.ix); Chinunkha (21–22.ix); Matipa Forest, Misuku Mtns. (22.ix–18.x); Chinunkha (18–22.x); Chere River Bridge, Northern Rhodesia (22–23.x); Nchenachena (23–25.x); Nyika Plateau (27.x.–19.xi); down to Nchenachena (19–23.xi); Mzimba (23–24.xi); Kasungu (24–25.xi); Nchisi Mtn. (25.xi–13.xii); Chitala River at Empire Cotton Growers' Experimental Station (13–21.xii) with side trips to Mpatanjoka near Salima (15.xii) and Mnema, Makanjila on Lake Nyasa (16.xii); Dedza (21–22.xii); Blantyre (22.xii–3.i.49) with side trips to Hynde Dam, Limbe (27.xii).

1949

Ndirandi Mtn. (1.i). On road to Tete, Mozambique (3–4.i), roadside near Micombo east of Tete (4–5.i); Kasumbadedza Village on south bank of Zambezi 5 miles west of Tete — listed and labeled as "near Tete" (5–31.i); roadside near Mpatamanga Gorge Bridge (31.i).; Blantyre (1.ii); Dally's Hotel, Chipoka, Lake Nyasa (2–3.ii); Mtimbuka as Tembuka on labels (3.ii–7.iii) with side trips to Chowe (12.ii) and Kausi Village, Lake Malombe (25.ii); Blantyre (7–9.iii); Cholo Mtn. (9–28.iii); Magombe Estate, Cholo (28–29.iii); Ruo & Lujeri Rivers, Mlanje Mtn. (29.iii–ll.iv); Blantyre (11–20.iv) with side trips to Limbe (16–17.iv) and Shire River at Chikwawa (18.iv). Left Nyasaland by air (20.iv.49).

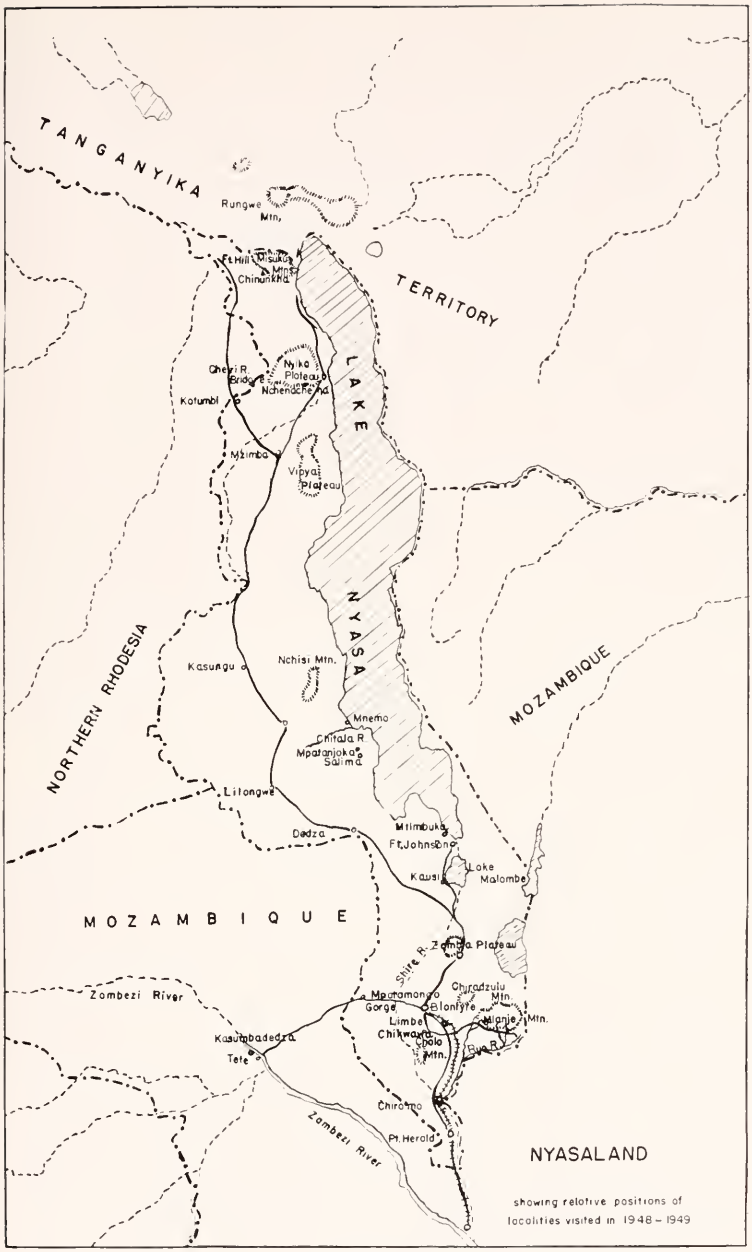
TANGANYIKA
TERRITORY
Rungwe Mtn.
Ft.Hill
Misuku Mtns
Chinunkha
Nyika Plateau
Nchenachena
Chezi R. Bridge
Kotumbi
Mzimba
Vipya Plateau
LAKE NYASA
NORTHERN RHODESIA
Kasungu
Nchisi Mtn.
Mnemo
Chitala R.
Mpatanjoka
Salima
Lilongwe
Dedza
Mlimbuka
Ft.Johnston
Lake Malombe
Kasisi
MOZAMBIQUE
MOZAMBIQUE
Zomba Plateau
Shire R.
Zambezi River
Mpatamanga Gorge
Chiradzulu Mtn.
Elonjwe
Limbe
Chikwawa
Ndala Mtn.
Mlanje Mtn.
Ruo R.
Kasumbadeza
Tete
Chiromo
Zambezi River
Pt.Herald
NYASALAND
showing relative positions of localities visited in 1948 – 1949

PLATE 1

PLATE 2

Above. Bridge built to ensnare Blue-Monkeys.

In Matipa Forest many types of snares were encountered, the one shown opposite was set for blue-monkeys (*Cercopithecus mitis moloneyi*) which, being averse to descending to the ground, take advantage of the artificial bridge connecting an outlying patch with the main forest.

Below. Jackal (*Thos a. adustus*) puppies from the Misukus.

Two jackal litters were brought in between September 27 and October 5. The puppies, though very wild, did well but required feeding every four hours until midnight.

PLATE 2

PLATE 3

Above. Whyte's Blesmol (*Cryptomys hottentotus whytei*).

These strange rodents are provided with enormous gnawing teeth but their eyes are reduced to pin points; external ears are lacking; and the tail is but an insignificant vestige in conformity with the animal's subterranean habits. They were not uncommon in the Misuku Mountains where the photograph was taken.

Below. Pegging out a Reedbuck's skin on the Vipya Plateau.

Shrinkage of skins of all the larger game animals was prevented by nailing them, on sacking, to the hard and well-packed ground. So frequently was the sun obscured by passing clouds on the higher plateaus that there was small risk of it damaging the hides; indeed the problem was more often one of getting them dried in a reasonable time.

PLATE 3

Bulletin of the Museum of Comparative Zoology

AT HARVARD COLLEGE

Vol. 110, No. 2

ZOOLOGICAL RESULTS OF A FIFTH EXPEDITION TO EAST AFRICA

II

BIRDS FROM NYASALAND AND TETE

By J. L. Peters and A. Loveridge

With Two Plates

CAMBRIDGE, MASS., U.S.A.

PRINTED FOR THE MUSEUM

June, 1953

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Proceedings of the New England Zoölogical Club (octavo) 1899–1948 — Published in connection with the Museum. Publication terminated with Vol. 24.

These publications issued at irregular intervals in numbers which may be purchased separately. Prices and lists may be obtained on application to the Director of the Museum of Comparative Zoölogy, Cambridge 38, Massachusetts.

Bulletin of the Museum of Comparative Zoology

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II

Birds from Nyasaland and Tete

By J. L. Peters[1] and A. Loveridge

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INTRODUCTION and ACKNOWLEDGEMENTS

In recent years the avifauna of Nyasaland has been studied so efficiently by Messrs. C. W. Benson and Jack Vincent that the junior author directed his efforts chiefly to other groups of vertebrates, the primary purpose of the expedition being an investigation of Nyasaland's poikilothermous montane fauna. The enquiry was financed by the Penrose Fund of the American Philosophical Society and a grant from the Museum of Comparative Zoology, on whose behalf it was carried out.

A synopsis of the itinerary is supplied in the caption accompanying Plate 1 — a map showing the position of the principal collecting localities. Altitudes, latitudes, longitudes and other information regarding the various camps will be furnished in the final report of this series which will deal with the general conclusions. All localities mentioned in the present paper are situated in Nyasaland except Tete, which is in Mozambique (= M).

In the case of camps that were situated in type localities, a special effort was made to secure topotypic material. Altogether topotypes of 27 different kinds of birds were preserved. Ten of these were from

[1]Five days after the identification of this collection had been completed, the senior author was suddenly stricken with the heart attack that led to his death on April 19, 1952. Not only will J. L. Peters be missed and mourned by his immediate colleagues and associates, but by that much wider circle of ornithologists who have come to rely on his monumental CHECK-LIST OF BIRDS OF THE WORLD which all will regret he was not spared to complete.

the Nyika Plateau where, through the generosity of Mr. C. W. Benson, the junior author had the services of his trained bird collector, Jali Makawa. Elsewhere, Loveridge did his own collecting. Altogether 510 skins, representing 203 species or races of birds, were obtained between August 1, 1948 and April 8, 1949.

Already Benson (1951, pp. 69–114) has reported on most of the nests and eggs, principally found on the Nyika by Jali Makawa. Some additional observations on nesting and breeding, together with notes on prey, parasites, etc. will be found in the following pages, together with many native names in use among the various tribes.

When the work of identification was concluded the junior author turned the manuscript over to Peters, who remarked that there would be some minor adjusting to be done before it could be typed. Just how much he contemplated will never be known. However, it had been mutually agreed already that the typescript should be submitted to Dr. J. P. Chapin and C. W. Benson for the benefit of their expert knowledge.

Half-a-dozen lots of birds whose subspecific identity appeared uncertain to the senior author, had been set aside for submission to Chapin, whose comments on their status have been included in this report. With characteristic thoroughness Dr. Chapin has also read the typescript and proposed a number of minor corrections. For his invaluable help we are more than grateful.

The typescript was then submitted to Mr. C. W. Benson, whose familiarity with Nyasaland birds is unequalled. He, also, went to considerable trouble, going over our findings and adjusting a number of subspecific identifications for which we wish to express our heartfelt thanks. He suggests that the locality "Nyika Plateau" is used rather loosely and that the undermentioned sylvicoline species:

Turacus schalowi marungensis
Pogoniulus leucomystax
Phyllastrephus flavostriatus alfredi
Seicercus ruficapillus johnstoni
Linurgus olivaceus rungwensis

were probably shot on the forested escarpment about 6000 feet, rather than on the grass-grown plateau itself at 7500 feet. Actually, however, some at least were taken in a forested gully that ran right up to the plateau in the vicinity of our camp, which was at 7500 feet. Unquestionably the birds formed a part of the original forest fauna.

The junior author takes this opportunity to thank his colleague J. C. Greenway for help in checking certain racial characters of forms whose identity was questioned by our correspondents; also for his generosity in lending the double-barreled shotgun with which all the larger birds were procured.

In the following discussion the families, genera and species of the non-passerines are in the order of Peters' Check-list, the passerine families as in the report on the birds of the fourth expedition (Peters and Loveridge, 1942, Bull. Mus. Comp. Zool., **89**, pp. 217–275); that is to say, within the families, both genera and species are substantially in the order adopted by Sclater in his Systema.

The senior author objected to citations and type localities being taken direct from Sclater and would doubtless have checked them as he did for our previous joint papers. Circumstances resulted in this being undertaken by the junior author who has verified all but 2 of the 118 references to ornithological journals, and most of those taken from volumes where the citations were not already covered by Peters Check-list. Sclater frequently omitted altitudes of type localities and these have been restored except in the case of Whyte's overestimate of 7000 feet for his camp in the "Masuka Range." These mountains appear as Misuku in recent Nyasaland government publications, and the resident Misuku tribesmen assured me that Misuku, rather than Masuku, is the correct rendering.

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SYSTEMATIC LIST OF SPECIES COLLECTED

PHALACROCORACIDAE

Phalacrocorax carbo lucidus>×<lugubris

♂ (M.C.Z. 278633) Mtimbuka.17.ii.49.

The White-breasted Cormorants of Nyasaland, as stated by Mackworth-Praed and Grant (1933, Ibis, pp. 746–7), are intermediate between *lucidus* (Lichtenstein), 1823, of the Cape, and *lugubris* Rüppell, 1845, of Ethiopia.

Phalacrocorax africanus africanus (Gmelin)

Pelecanus africanus Gmelin, 1789, Syst. Nat., **1**, pt. 2, p. 577: Africa.

1 (M.C.Z. 278634) Mnema, Lake Nyasa. 16.xii.48.
6 ♂♂, 6 ♀♀ (M.C.Z. 278635–6) Mtimbuka. 17 & 24.ii.49.

The series from Mtimbuka were shot primarily for the pot, at the request of my skinners who were possibly influenced by the prevailing food shortage resulting from the failure of the rains.

"On rising at Chipoka, much to my surprise, as I had never before seen such a concentration, about two hundred Long-tailed Cormorants were quietly swimming, actively diving, or, periodically flying low over the water to get ahead of a shoal of fish that were about thirty yards from my door on the lakeshore." (From diary of 3.ii.49).

ANHINGIDAE

Anhinga rufa rufa (Daudin)

Plotus rufus Daudin, 1802, Buffon Hist. Nat., ed. Didot, Quadr., **14**, p. 319: Senegal.

1 ♂, 3 ♀♀ (M.C.Z. 278647–50) Mtimbuka. 17–24.ii.49.

A fifth, shot while sitting on the summit of the tall bole of a drowned Hyphaene palm standing far out in the lake, was lost when it toppled into the hollow interior of the trunk.

ARDEIDAE

Butorides striatus atricapillus (Afzelius)

Ardea atricapilla Afzelius, 1804 (1805), Kongl. Vet. Acad. Nya Handl. (Stockholm), **25**, p. 264: Sierra Leone.

1 ♂, 3 ♀♀ (M.C.Z. 278651–4) Mtimbuka. 22.ii.49.

Native name. Kachamba (Yao).

ARDEOLA RALLOIDES RALLOIDES (Scopoli)

Ardea ralloides Scopoli, 1769, Annus. 1, Hist. Nat., p. 88: "In Carniolica" = Krain.

1 ♂, 2 ♀ ♀ (M.C.Z. 278655–7) Mtimbuka. 22–24.ii.49.

BUBULCULUS IBIS IBIS (Linné)

Ardea Ibis Linné, 1758, Syst. Nat., ed. 10, **1**, p. 144: Egypt.

♂ ♀ (M.C.Z. 278658–9) Mtimbuka. 10.ii.49.

Diet. The stomach of one Cattle Egret held grasshoppers and beetles, that of the other, insects — mostly beetles — much broken up.

EGRETTA GARZETTA GARZETTA (Linné)

Ardea Garzetta Linné, 1766, Syst. Nat., ed. 12, **1**, p. 237: "Oriente" ex. Brisson.

♂ (M.C.Z. 278660) Mtimbuka. 8.ii.49.

Diet. This Little Egret's stomach held two small green fish (*Haplochromis callipterus*), called *dondolo* by the local Yao.

Parasites. A hippoboscid fly (*Lynchia albipennis*) and nematode were preserved.

SCOPIDAE

SCOPUS UMBRETTA BANNERMANNI Grant

Scopus umbretta bannermanni C. H. B. Grant, 1914, Bull. Brit. Orn. Club., **35**, p. 27: Mt. Leganisho, 6600 ft., Kenya Colony.

♂ (M.C.Z. 267661) Mtimbuka. 18.ii.49.

♂ (M.C.Z. 267662) near Tete, M. 25.i.49.

Native name. Nshengwe (Nyungwe).

Diet. Eight frogs (*Xenopus mülleri*) were in the gullet and stomach of one Hammer-head Stork when shot at 9 A.M.; fish in the Nyasa bird.

THRESKIORNITHIDAE

THRESKIORNIS AETHIOPICA AETHIOPICA (Latham)

Tantalus aethiopicus Latham, 1790, Ind. Orn., **2**, p. 706: "Aethiopia" = Egypt?

♂ (M.C.Z. 278663) near Tete, M. 10.i.49.

Native name. Kidiadzomba (Nyungwe).

Though this Sacred Ibis was shot in the early morning and hung in a cool place, four hours later when I reached camp it was smelling abominably. This is a good indication of the difficulties encountered at Tete where a temperature of 100° in the shade was an almost daily occurrence.

ACCIPITRIDAE

Aviceda cuculoides verreauxi Lafresnaye

Aviceda Verreauxii Lafresnaye, 1846, Revue Zoöl., p. 130: "Port Natal," i.e. Durban, Natal.

♂ (M.C.Z. 278664) Likabula River. 1.viii.48.

Diet. Large migratory locust and many grasshoppers in the stomach of this Cuckoo-Falcon which was perched in the same tree as a hornbill (*Tockus p. neumanni*). A second falcon was seen among the palms on the lakeshore near Mtimbuka.

Milvus migrans parasitus (Daudin)

Falco parasitus Daudin, 1800, Traité d'Orn., **2**, p. 150: South Africa ex. Levaillant.

♂ (M.C.Z. 278665) Misuku Mtns. 22–30.ix.48.

Breeding. Testes very large.

Diet. Grasshopper in stomach.

Parasites. Two lice preserved.

Habits. At low water I went far out on the reef until forced to beat a hasty retreat before the swirling currents of an incoming tide that moved so swiftly there was a risk of being trapped. To my right on each of a dozen posts, possibly marking a deeper channel, was perched a kite with feathers ruffling in the strong breeze. As in turn each post was threatened with submergence by the rising water, the birds adjourned to the seashore where they settled on the sandy beach. Then one rose with the hairy husk of a coconut, another gave chase until it was dropped. In quick succession it was picked up by three different kites which swooped to seize it, only to be dropped again when the bird was closely pursued by its companions. The entire affair had very much the appearance of a game. (Dar es Salaam, 12.vii.48).

As July 12 would be much too early for Paleoarctic migrants (*m. migrans*) and the validity of *m. tenebrosus* is questionable, Chapin (note of 29.v.52) concurs with the junior author's sight allocation of these birds.

Accipiter badius polyzonoides Smith

Accipiter polyzonoides A. Smith, 1838, Ill. Zool. S. Afr. Aves, pl. xi: South Africa north of lat. 26° S. = Mafeking, Transvaal.

♀ (M.C.Z. 278666) near Tete, M. 11.i.49.

Native name. Kafumpe (Nyungwe, but not specific).

Stomach empty at 11 A.M., and gonads undeveloped.

Melierax gabar (Daudin)

Falco gabar Daudin, 1800, Traité d'Orn., **2**, p. 87: Interior of South Africa ex. Levaillant.

♀ (M.C.Z. 278668) Mtimbuka. 23.ii.49.
♂ (M.C.Z. 278667) near Tete, M. 8.i.49.

Native name. *Kafumpe* (Nyungwe, but not specific); *katotola* (Yao).

Diet. Chicken legs in stomach of the ♂ Gabar Goshawk when shot from a baobab just before sunset; bird remains in the melanistic ♀.

Parasite. A hippoboscid fly escaped.

Haliaeetus vocifer vocifer (Daudin)

Falco vocifer Daudin, 1800, Traité d'Orn., **2**, p. 65: Keurboom River, Cape Province.

♂ ♀ (M.C.Z. 278669–70) Mtimbuka. 7 & 17.ii.49.

Brehm's race *clamans* is untenable according to Mackworth-Praed and Grant (1934, Ibis, p. 832).

Diet. Fish in stomachs.

Parasites. Two hippoboscids (*Lynchia dukei*) were present on one of these Sea-Eagles.

Necrosyrtes monachus pileatus (Burchell)

Vultur pileatus Burchell, 1824, Travels, **2**, p. 195, note: Hopetown District, Cape Province.

♀ (M.C.Z. 278671) Mtimbuka. 14.ii.49.

Parasites. A louse preserved (pinned dry).

Circus macrourus (Gmelin)

Accipiter macrourus S. G. Gmelin, 1770 (1771), Nov. Comm. Acad. Petrop., **15**, p. 439, pls. viii–ix: Voronezh, Southern Russia.

♀ (M.C.Z. 278672) Nyika Plateau. 17.xi.48.

Diet. A swamp rat (*Otomys kempi*) and skink (*Mabuya* sp. nov.) in its stomach.

Polyboroides typus typus (Smith)

Polyboroides typus A. Smith, 1829, S. African Commercial Advertiser: Eastern Cape Province.

Poloboroides (*sic*) *typicus* A. Smith, 1830, S. Afr. Quart. Journ. (1), p. 107: Eastern Cape Province.

In the waters of Lake Nyasa just south of Mtimbuka, groups of crownless Hyphaene palms — looking like the pillars of some ancient

temple — provide tangible evidence of the rise in lake level. The trunks of these drowned palms, now riddled with woodpecker holes, provide apparently ideal nesting sites for kingfishers and swallows. Intent on extracting the nestlings was a Harrier-Hawk which, with rapidly flapping wings, was clambering up the trunk of one palm a hundred yards off shore (Mtimbuka, 21.ii.49).

PHASIANIDAE

Francolinus sephaena zambesiae Praed

Francolinus sephaena zambesiae Praed, 1920, Bull. Brit. Orn. Club, **40**, p. 140: Mesanangue, 70 miles above Tete, Zambezi River.

♀ (M.C.Z. 278573) near Tete, M. 10.i.49.

Native name. Nkwali (Nyungwe).

Francolinus levaillanti crawshayi Ogilvie-Grant

Francolinus crawshayi Ogilvie-Grant, 1896, Ibis, p. 482, pl. xii: "Cheni-cheni" i.e. Nchenachena Mtn., 7400 feet, Nyika Plateau, Nyasaland.

2 ♂♂, 2 ♀♀ (M.C.Z. 278574–7) Nyika Plateau. 30.x–17.xi.48.

Breeding. On November 5, testes large.

Pternistes afer intercedens Reichenow

Pternistes cranchi intercedens Reichenow, 1909, Orn. Monatsb., **17**, p. 88: Lake Rukwa and base of Livingstone Mtns. on Lake Nyasa.

3 ♂♂, 1 ♀ (M.C.Z. 278578–81) Nchenachena. 22.xi.48.

Two well-spurred adult ♂♂ have the feathers of the abdomen and flanks with their white central portion reduced in area and the narrow shaft stripes broadly edged with chestnut. The other two, presumably immature, have the pale central portion wider, broader shaft stripes, and much narrower edging.

Coturnix coturnix africana Temminck & Schlegel

Coturnix vulgaris africana Temminck & Schlegel, in Siebold, 1849, Fauna Jap., Aves, p. 103, in text: South Africa.

♀ (M.C.Z. 278582) Nyika Plateau. 1.xi.48.

NUMIDIDAE

Numida meleagris mitrata Pallas

Numida mitrata Pallas, 1767, Spic. Zool., **1**, fasc. 4, p. 18, pl. iii: Madagascar.

3 ♀♀ (M.C.Z. 278583–5) near Tete, M. 10–27.i.49.

Native name. *Kanga* (pl. *zingkanga:* Nyungwe).

Breeding. Apparently not, for on January 13 several flocks were seen and only one pair during the entire week. These observations may reflect the abnormally dry conditions prevailing during January, 1949, for Benson informs us that in Nyasaland — where the breeding season for guinea fowl is particularly well-defined — egg-laying is confined to the period from December to March.

RALLIDAE

Limnocorax flavirostra (Swainson)

Gallinula flavirostra Swainson, 1837, Bds. W. Afr., **2**, p. 244, pl. xxviii: Senegal.

3 ♂♂, 2 ♀♀ (M.C.Z. 278586–90) Mtimbuka. 7.ii.49.

Native name. *Ngurugusi* or *ngurukusi* (Yao).

Two exhibit traces of juvenile plumage.

Porzana porzana (Linné)

Rallus Porzana Linné, 1766, Syst. Nat., ed. 12, **1**, p. 262: Europe = France.

♂ (M.C.Z. 278591) near Tete, M. 27.i.49.

Porphyrula alleni (Thomson)

Porphyrio Alleni Thomson, 1842, Ann. Mag. Nat. Hist., **10**, p. 204: "Idda," i.e. Idah, Niger River, Southern Nigeria.

♂ ♀ (M.C.Z. 278594–5) Mtimbuka. 7.ii.49.

♂ ♀ (M.C.Z. 278592–3) near Tete, M. 10.i.49.

Native name. *Viliziui* (Nyungwe); *wititi* (Yao).

Sarothrura lineata antonii Madarasz & Neumann

Sarothrura antonii Madarasz & Neumann, 1911, Orn. Monatsb., **19**, p. 186: Ndassekera, near Shirati, Tanganyika Territory.

♀ (M.C.Z. 278673) Lichenya Plateau. 10.viii.48.

This determination has been confirmed by Dr. J. P. Chapin, who writes: "I have no doubt that it is an adult female of *Sarothrura lineata antonii*. We have no specimen of that race here, and only one poor male of the nominate form from South Africa. It surprised me a little that a female should have so much rufous about the head and neck. Mackworth-Praed & Grant (1937, Ibis, pp. 627–628) do not mention that, but in *S. lugens* ♀ there is a good deal of rufous on the head too. The fact that this rufous extends so far down on the foreneck seems to prove that your bird is really *antonii*. I have seen males

from Mt. Kenya, and this greater extent of rufous is one of the main racial characters of *antonii*. The short toes and the presence of rufous on the tail prove the species is *S. lincata*. Congratulations to you on having this rare bird in the M.C.Z."

We note that Belcher (1930, p. 67) "put up a small rail on Mlanje Plateau early in November 1924, which" he thought was referable to *lincata;* "it was in tussocky grass not far from the forest edge near the Boma Cottage." Consequently within a mile or so of where this specimen was snared.

JACANIDAE

Actophilornis africana (Gmelin)

Parra africana Gmelin, 1789, Syst. Nat., **1**, pt. 2, p. 709: Africa; restricted to Ethiopia by Grant, 1915, Ibis, p. 59.

♀ (M.C.Z. 278596) Mtimbuka. 24.ii.49.
juv. ♀ (M.C.Z. 278597) near Tete, M. 25.i.49.

SCOLOPACIDAE

Tringa glareola Linné

Tringa Glareola Linné, 1758, Syst. Nat., ed. 10, **1**, p. 149: Europe = Sweden (restricted).

♂ (M.C.Z. 278598) near Tete, M. 24.i.49.

Native name. Malisa (Nyungwe, who do not distinguish it from *Actitis*).

Actitis hypoleucos (Linné)

Tringa Hypoleucos Linné, 1758, Syst. Nat., ed. 10, **1**, p. 149: Europe = Sweden (restricted).

♂ (M.C.Z. 278599) near Tete, M. 24.i.49.

Native name. Malisa (Nyungwe, who do not distinguish it from *Tringa*).

GLAREOLIDAE

Cursorius temminckii temminckii Swainson

Cursorius Temminckii Swainson, 1822, Zool. Illustr., **2**, text to pl. cvi: No type locality = Senegal.

2 ♂♂ 2 ♀♀ 1 o (M.C.Z. 278600–4) near Tete, M. 26.i.49.

STERNIDAE

Chlidonias leucoptera (Temminck)

Sterna leucoptera Temminck, 1815, Man. d'Orn., p. 483: Mediterranean Coasts.

2 ♂♂ (M.C.Z. 278605–6) Mtimbuka. 17.ii.49.

Native name. Kawie (Yao) for the White-winged Black Tern.

COLUMBIDAE

Columba arquatrix arquatrix Temminck

Colomba (*sic*) *Arquatrix* Temminck, in Knip, 1809, Les Pigeons, les Colombes, p. 11, pl. v: South Africa = Antenoquoi Country, Cape Province.

♀ (M.C.Z. 278607) Zomba Plateau. 7.ix.48.

♂ (M.C.Z. 278608) Nyika Plateau. 5.xi.48.

Breeding. In November testes large.

Streptopelia semitorquata semitorquata Rüppell

Columba semitorquata Rüppell, 1837, Neue Wirbelth., Vögel, p. 66, pl. xxiii, fig. 2: Taranta Mountains, Ethiopia.

♀ (M.C.Z. 278609) Zomba Plateau. 7.ix.48.

Oena capensis capensis (Linné)

Columba capensis Linné, 1766, Syst. Nat., ed. 12, **1**, p. 286: Cape of Good Hope.

♀ (M.C.Z. 278610) near Tete, M. 8.i.49.

Native name. Katunduru (Nyungwe).

Aplopelia larvata larvata (Temminck)

Columba larvata Temminck, in Knip, 1810, Les Pigeons, les Colombes, p. 71, pl. xxxi: Antenoquoi Country, i.e. Knysna, Cape Province.

♂ ♀ (M.C.Z. 278611–2) Misuku Mtns. 15.x & 26.ix.48.

Native name. Ntosi (Misuku).

Breeding. On September 26 ova were enlarging in the Lemon-Dove which was found in a native snare beside a path in the Matipa Forest.

PSITTACIDAE

Poicephalus meyeri transvaalensis Neumann

Poicephalus meyeri transvaalensis Neumann, 1899, Orn. Monatsb., **7**, p. 25: Transvaal.

♂ (M.C.Z. 278613) near Tete, M. 14.i.49.

Native name. Gimpsi (Nyungwe).

MUSOPHAGIDAE

Tauraco livingstonii marungensis (Reichenow)

Turacus schalowi var. *marungensis* Reichenow, 1902, Vög. Afr., **2**, p. 52: Marungu and north of Lake Nyasa.

2 ♂♂, 1 ♀ (M.C.Z. 278614–6) Vipya Plateau. 17.ix.48.
♂ (M.C.Z. 278617) Misuku Mountains. 23.ix.48.
2 ♂♂ (M.C.Z. 278618–9) Nyika Plateau. 4–9.xi.48.

Benson (1940, p. 405; 1951, p. 86) prefers to treat the Marungu Lourie as a race of *schalowi* (Reichenow).

Native names. Chilembo (Misuku); *hluhlulu* (Ngoni).

Breeding. On November 4, testes large.

Tauraco livingstonii livingstonii (Gray)

Turacus livingstonii G. R. Gray, 1864, Proc. Zool. Soc. London, p. 44: Manganja Highlands, 3000–4000 feet, Nyasaland.

♂ ♀ (M.C.Z. 278620–1) Lichenya Plateau. 11.viii.48.
♂ (M.C.Z. 278622) Zomba Plateau. 7.ix.48.
2 ♀♀ (M.C.Z. 278623–4) Cholo Mountain. 11–12.iii.49.

Type locality. R. E. Moreau writes that the Manganja Highlands are at the southern end of Zomba Plateau and the type must have come from between 15°30′ and 16° S., east of the Shire. It is wrongly placed on Reichenow's map; cf. map in Livingstone, 1865, Expedition to the Zambezi.

Native name. Skurukuru (Yao).

Breeding. On August 11, ova small. However, during the month Nyasa Louries were going about in pairs and constantly calling.

Parasites. Lice preserved.

Corythaixoides concolor concolor (Smith)

Corythaix concolor A. Smith, 1833, S. Afr. Quart. Journ. (2), p. 48: Inland from Port Natal.

♂ (M.C.Z. 278632) Mtimbuka. 18.ii.49.
3 ♂♂, 4 ♀♀ (M.C.Z. 278625–31) near Tete, M. 8–27.i.49.

Native name. Kuwe (Nyungwe).

Breeding. On January 8, ovules small. Like Vincent (1934, p. 768), I found South African Goaway-Birds relatively common near Tete, where they provided a welcome addition to the larder.

CUCULIDAE

Cuculus canorus subsp.

A bird heard calling "cuckoo" very distinctly in the early morning, was presumably the typical form rather than *C. c. gularis* Stephens (Mtimbuka, 5.ii.49).

Clamator jacobinus pica (Hemprich & Ehrenberg)

Cuculus pica Hemprich & Ehrenberg, 1833, Symb. Phys., Aves, sig. r. note 2: Ambukohl, Dongola.

♀ (M.C.Z. 278674) Mtimbuka. 11.ii.39.

For use of this name see footnotes to Peters (1940, p. 13), and Friedmann (1948, Washington Acad. Sci. Monogr., 1, p. 39).

Native name. *Kawilangwaula* (Yao).

Chrysococcyx klaas klaas (Stephens)

Cuculus Klaas Stephens, in Shaw, 1815, Gen. Zool., 9, p. 128: "Cape of Good Hope" etc. i.e. Cape Province.

♀ (M.C.Z. 278675) Misuku Mtns. 6.x.48.
♀ (M.C.Z. 278676) Cholo Mtn. 12.iii.49.

Native name. *Kaicholocholo* (Misuku).

Chrysococcyx caprius (Boddaert)

Cuculus caprius Boddaert, 1783, Table Pl. enlum, p. 40: Cape of Good Hope ex. Daubenton.

♂ (M.C.Z. 278677) Mtimbuka. 7.ii.49.

Centropus superciliosus burchellii Swainson

Centropus Burchelli Swainson, 1838 (1837), Anim. in Menag., p. 321: South Africa, i.e. Cape Province.

♂ ♀ (M.C.Z. 278678–9) Mtimbuka. 2.iii.49.

See Benson (1940, p. 403; 1951, p. 86) for discussion on Nyasaland records assigned to *senegalensis fasciipygialis* and related forms.

TYTONIDAE

Tyto capensis capensis (Smith)

Strix capensis A. Smith, 1834, S. Afr. Quart. Journ. (2), p. 317: South Africa; restricted to Cape Town by Mackworth-Praed & Grant.

♀ (M.C.Z. 278680) Nyika Plateau. 8.xi.48.

Breeding. On November 11, ova very small.

Diet. In the stomach were fur and bones of an *Otomys*, presumably *kempi*.

Habitat. Shot in a swamp where, judging by the numerous feathers, it habitually rested in a regular "form" beneath a bower of long grass. Cf. Vincent (1934, p. 789).

Bubo lacteus (Temminck)

Strix lactea Temminck, 1820, Pl. col., livr. 1, pl. iv: Senegal.

♂ (M.C.Z. 278681) Chitala River. 18.xii.48.

Shot in an enormous *Acacia albida* growing on the bank of the dry river bed.

Diet. The stomach held remains of a snake 400 mm. long (*Aparallactus* sp.) whose eggs measured 30 x 8 mm.; one adult toad (*Bufo carens*) and the remains of two more; five very large solpugids; and one centipede, 100 mm. in length, that conceivably the snake might have been engaged in swallowing when seized.

Glaucidium perlatum (Vieillot)

Strix perlata Vieillot, 1818, Nouv. Dict. Hist. Nat., **7**, p. 26: Senegal.

♂♂ (M.C.Z. 278682–3) near Tete, M. 14–24.i.49.

Native name. Ndsidsi (Nyungwe).

If Rand's (1951, Nat. Hist. Misc., No. 86) conclusions are correct, then these birds should be assigned to *licua* (Lichtenstein) of South Africa. On the basis of M.C.Z. material, however, the three races appeared ill-defined to the junior author.

Breeding. In January, testes small.

Diet. One Pearl-spotted Owlet was shot at dusk while engaged in eating a nightjar (*S. f. mossambicus* of which part was in its claws and part in its stomach; the stomach of the other owlet held a skink (*Riopa sundevallii*) and huge cricket (*Brachytrypetes membranaceus*).

STRIGIDAE

Ciccaba woodfordii woodfordii (Smith)

Noctua Woodfordii A. Smith, 1834, S. Afr. Quart. Journ. (2), p. 312: South Africa.

juv. ♂ (M.C.Z. 278684) Misuku Mtns. 12.x.48.

Native name. Mpuulu (Misuku).

Breeding. Halfgrown in nestling plumage. On the crown each downy feather is buffy at base, separated by a narrow rufous to dark

brown crossbar from the white tip; white predominates on the forehead and pale brown on the back to the tail coverts while the breast is mainly buffy; the flight feathers and tail are dark brown narrowly barred with paler; tail feathers broadly tipped with white; legs on to bases of the toes clothed in buffy white down.

CAPRIMULGIDAE

Caprimulgus poliocephalus guttifer Grote

Caprimulgus pectoralis guttifer Grote, 1921, Journ. f. Orn., **69**, p. 125: Mlalo, Usambara Mountains, Tanganyika Territory.

♀ (M.C.Z. 278685) Vipya Plateau. 17.ix.48.

Native names. Lunkuwe (Misuku); *nalwewe* (Ngoni).

The senior author put this skin on one side for further study. When circumstances made this impossible, the bird was sent to Dr. Chapin who replied (13.v.52): "I have compared your Vipya ♀ with four ♀♀ of *C. p. ruwenzorii*. It scarcely differs from *ruwenzorii* in color of head and body, but has somewhat smaller white areas at the tips of the outer tail quills. There is no doubt as to the Vipya bird being *guttifer*."

Breeding. On September 17, ovules enlarged, the largest 4 mm. On September 23 one of the natives engaged in clearing bracken from a site selected for my tent at the forest edge, Misuku Mountains, invited attention to a pair of nightjar eggs lying on bare ground without any attempt at a nest. The eggs were white, blotched and mottled all over with pale brown, and measured 26 x 20 mm. Both eggs were cold; one was almost fresh, the other held a well-developed embryo. On September 29 a bird was flushed from two eggs laid on absolutely bare ground at the base of a stunted tree (in which was a bees' nest) in the centre of an extensive burnt-over area surrounded by secondary forest, also on the Matipa-Wilindi Ridge. Both eggs were blowable though containing traces of embryos. The parent birds were not collected but Benson (1949, Ann. Transvaal Mus., **21**, p. 166) concurs in attributing them to *guttifer*.

Parasites. Nematode worms (*Aprocta* sp.) were removed from the eye.

Scotornis fossii mossambicus (Peters)

Caprimulgus mossambicus Peters, 1868, Journ. f. Orn., **16**, p. 134: Inhambane, Mozambique.

2 ♂♂, 1 ♀ (M.C.Z. 278686–8) near Tete, M. 11–25.i.49.

Grant & Mackworth-Praed (1937, Bull. B.O.C., **58**, p. 18) recognize no races.

Native name. *Bumpwa* (Nyungwe, for all nightjars).

Enemies. A fourth nightjar was being devoured by a Pearl-spotted Owlet (*G. perlatum*) scarcely larger than itself.

Semeïophorus vexillarius Gould

Semeïophorus (*Macrodypteryx*) *vexillarius* Gould, 1838, Icones Av., pt. 2, pl. (13) and text: orig. type loc. erroneous = Sierra Leone.

♂ (M.C.Z. 278689) near Tete, M. 14.i.49.

Native name. *Bumpwa* (Nyungwe, for all nightjars).

TROGONIDAE

Heterotrogon vittatus vittatus (Shelley)

Hapaloderma vittatum Shelley, 1882, Proc. Zool. Soc. London, p. 306: Mamboio, Tanganyika Territory.

3 ♂♂, 1 ♀ (M.C.Z. 278690–3) Misuku Mtns. 24.ix–1.x.48.

Native name. *Pelependwe* (Misuku).

ALCEDINIDAE

Ceryle maxima maxima (Pallas)

Alcedo maxima Pallas, 1769, Spic. Zool., fasc. 6, p. 14: Cape of Good Hope.

♂ ♀ (M.C.Z. 278694–5) Mtimbuka. 14.ii.49.

Native name. *Namkapakapa* (Yao).

Ceryle rudis rudis (Linné)

Alcedo rudis Linné, 1758, Syst. Nat., ed. 10, **1**, p. 116: Egypt.

♂ (M.C.Z. 278696) Mtimbuka. 17.ii.49.

Native name of Pied Kingfisher. *Namkapakapa* (Yao, but not specific).

Alcedo cristata cristata (Pallas)

Alcedo cristata Pallas, in Vroeg, 1764, Cat., Adumbr., p. 1: Cape of Good Hope.

♂ ♀ (M.C.Z. 278697–8) Mtimbuka. 17.ii.49.

Native name of Malachite Kingfisher. *Changombe* (Yao).

MEROPIDAE

Melittophagus pusillus meridionalis Sharpe

Melittophagus meridionalis Sharpe, 1892, Cat. Bds. Brit. Mus., **17**, p. 44 (in key), p. 45, pl. i, fig. 4: "Southeastern Africa from Natal to the Zambezi," etc. type in Brit. Mus. from Pinetown, Natal.

♂♂ (M.C.Z. 278699–700) near Tete, M. 22.i.49.

Native name. *Songosongo* (Nyungwe). It is a curious coincidence that the name for the Southern Little Bee-eater should be so similar to the Manganja one for the Black Mamba, which they call *songo*.

Aerops boehmi (Reichenow)

Merops (*Melittophagus*) *boehmi* Reichenow, 1882, Orn. Centralbl., **7**, p. 62: Bumi, Tanganyika Territory.

♀ (M.C.Z. 278701) Mtimbuka. 28.ii.49.

This was the only Böhm's Bee-eater seen during nine months, which tends to confirm Benson's (1940, p. 412) opinion that the species is decidedly uncommon in Nyasaland. Vincent, apparently, did not encounter it at all.

Native name. *Kasakangoni* (Yao).

Merops superciliosus persicus Pallas

Merops persicus Pallas, 1773, Reise versch. Prov. Russ. Reichs, **2**, p. 708: Shores of Caspian Sea.

1 ♂, 2 ♀♀ (M.C.Z. 278702–5) near Tete, M. 7–14.i.49.

Native name. *Kafudya* (Nyungwe, but not specific).

Breeding. Ova small.

Merops nubicoides Des Murs & Pucheran

Merops nubicoides Des Murs & Pucheran, 1846, Rev. Zool., p. 243: "Port Natal" in error = Ouri River, Transvaal.

1 ♂, 2 ♀♀ (M.C.Z. 278706–8) near Tete, M. 10–12.i.49.

Vincent (1934, p. 780) and Benson (1940, p. 412) treat the Southern Carmine Bee-eater as a race of *nubicus*. The reasons for considering it a full species have been given by Chapin (1939, p. 322) and followed by Peters (1945, p. 238). Chapin (note of 29.v.52) still considers *nubicoides* sufficiently distinct to be regarded as a full species.

Native name. *Kafudya* (Nyungwe, but not specific).

CORACIIDAE

Coracias garrulus garrulus (Linné)

Coracias Garrulus Linné, 1758, Syst. Nat., ed. 10, **1**, p. 107: Europe = Sweden (restricted).

♀ ♀ (M.C.Z. 278709–10) near Tete, M. 10.i.49.

Native name. *Kakeya* (Nyungwe, but generic).

Diet. Frog's bones preserved from stomach.

Coracias caudata caudata Linné

Coracias caudata Linné, 1766, Syst. Nat., ed. 12, **1**, p. 160: Angola.

♂ ♀ (M.C.Z. 278711–2) near Tete, M. 12–19.i.49.

Native name. *Kakeya* (Nyungwe, but generic).

Diet. Had eaten nauseous bugs of the same species that swarmed in my tent on the night (5.i.49) of our arrival at Kasumbadedza.

Eurystomus glaucurus suahelicus Neumann

Eurystomus afer suahelicus Neumann, 1905, Journ. f. Orn., **53**, p. 186: "Tschara" i.e. Chara, Tana River, Kenya Colony.

♂ (M.C.Z. 278713) Mtimbuka. 19.ii.49.

Native name. *Chole* (Yao).

Breeding. Testes very small.

Diet. Only a large scarab in stomach at 6 A.M. when this roller was resting on an aloe pole surrounded by twittering birds that mistook it for a hawk.

UPUPIDAE

Upupa epops africana Bechstein

Upupa africana Bechstein, 1811, Kurze Uebers., **4**, Th. 1, p. 172: Congo to the Cape.

♂ (M.C.Z. 278714) near Tete, M. 21.i.49.

Native name. *Mofsi* (Nyungwe).

PHOENICULIDAE

Phoeniculus purpureus marwitzi (Reichenow)

Irrisor erythrorhynchos marwitzi Reichenow, 1906, Orn. Monatsb., **14**, p. 171: Mkalama, Tanganyika Territory.

♂ (M.C.Z. 278715) Mtimbuka. 2.iii.49.

Rhinopomastus cyanomelas schalowi Neumann

Rhinopomastus schalowi Neumann, 1900, Journ. f. Orn., **48**, p. 221: Usandawe, Tanganyika Territory.

ad. ♂, imm. ♂ (M.C.Z. 278716–7) near Tete, M. 17.i.49.

BUCEROTIDAE

Tockus pallidirostris neumanni (Reichenow)

Lophoceros pallidirostris neumanni Reichenow, 1894, Vög. Deutsch Ost.-Afr., p. 128: Mgera, Tanganyika Territory.

♀ (M.C.Z. 278718) Likabula River. 1.viii.48.

Diet. Praying mantis and *Phymateus* in stomach.

Parasites. Nematode (*Physaloptera* sp.) was preserved.

Tockus flavirostris leucomelas (Lichtenstein)

Buceros leucomelas Lichtenstein, 1842, Verz. Samml. Vög. Kafferul., p. 17: Kaffirland.

♂ ♂ (M.C.Z. 278719–20) near Tete, M. 21–26.i.49.

Native name. Goto (Nyungwe).

Diet. Beetles and fruit seeds in stomach.

Bycanistes brevis brevis Friedmann

Bycanistes cristatus brevis Friedmann, 1929, Proc. New Eng. Zoöl. Club, **11**, p. 32: Mount Lutindi, Usambara Mountains, Tanganyika Territory.

♂ ♀ (M.C.Z. 278721–2) Misuku Mtns. 12.x.48.

Native name. Nonga (Misuku).

CAPITONIDAE

Pogoniulus leucomystax leucomystax Sharpe

Barbatula leucomystax Sharpe, 1892, Ibis, p. 310: Sotik, Kenya Colony.

♂ (M.C.Z. 278723) Nyika Plateau. 6.xi.48.

Breeding. Testes large.

Pogoniulus chrysoconus rhodesiae Grant

Pogoniulus chrysoconus rhodesiae C. H. B. Grant, 1915, Bull. Brit. Orn. Club, **35**, p. 100: Chambezi Valley, northeastern Rhodesia.

♂ (M.C.Z. 278724) Mtimbuka. 1.iii.49.

Native name. Nangololo (Yao).

Peters rejected the idea of this bird being *P. c. extoni* (Layard), used by Vincent (1935, p. 8) for birds from eastern Mozambique.

Pogoniulus bilineatus bilineatus (Sundevall)

Megalaema bilineata Sundevall, 1850, Oefv. K. Vet.-Akad. För., **7**, p. 109: "Caffraria inferiore," type from Umlazi River, Natal.

2 ♂♂, 2 ♀♀ (M.C.Z. 278725–8) Cholo Mtn. 19–23.iii.49.

All these birds were heard making their froglike calls afar off in the forest and were summoned to the trees above us by our imitation of the note. See Benson (1948, Ibis, p. 60).

Trachyphonus vaillantii vaillantii >< suahelicus

♂ (M.C.Z. 278729) near Tete, M. 26.i.49.

An absolute intermediate between the South African *vaillantii* and the race described from Useguha, Tanganyika Territory.

Native name. Sakamalia (Nyungwe).

INDICATORIDAE

Prodotiscus insignis zambesiae Shelley

Prodotiscus zambesiae Shelley, 1894, Ibis, p. 8: Zomba, Nyasaland.

♀ (M.C.Z. 278730) Ruo R., Mlanje Mtn. 7.iv.49.

Diet. At 4 p.m. this Sharp-billed Honey-Guide was feeding on termites flighting after three days and nights of incessant rain.

PICIDAE

Campethera abingoni abingoni (Smith)

Chrysoptilus Abingoni A. Smith, 1836, Report Exped. Centr. Afr., p. 53: "Port Natal," i.e. Durban, Natal.

♀♀ (M.C.Z. 278732–3) Mtimbuka. 11.ii.49.
♀ (M.C.Z. 278731) near Tete, M. 17.i.49.

The two Mtimbuka woodpeckers were killed on an acacia trunk with a single shot.

Native name. Namagogoda (Yao).

Dendropicos fuscescens fuscescens (Vieillot)

Picus fuscescens Vieillot, 1818, Nouv. Dict. Hist. Nat., **26**, p. 86: South Africa; restricted to Grootvaders Bosch by Roberts.

♂ (M.C.Z. 278734) Mtimbuka. 1.iii.49.

We are aware that Vincent (1935, p. 19) referred his Fort Johnston ♂♂ to *D. f. hartlaubii*, and Benson (1951, p. 91) following C. M. N. White's revision (1947, Ibis, p. 611), refers a Mzimba ♀ to *D. f.*

camacupae Bowen. In view of White's conclusion, Benson, who has not seen the birds, suggests that both Mtimbuka and Tete birds should be referred to *camacupae*.

Dendropicos fuscescens hartlaubii Malherbe

Dendropicos Hartlaubii Malherbe, 1849, Revue et Mag. Zool. (2), **1**, p. 532: Zanzibar.

♀ (M.C.Z. 278735) near Tete, M. 13.i.49.

At a height of three feet from the ground, this Zanzibar Cardinal Woodpecker was clinging to, and hammering at, a hollow stick with extraordinary sonic effect. The bird, killed clean with No. 12 shot, remained clinging to the stick, the sole indication of her sudden death being the falling back of her head.

Mesopicos griseocephalus ruwenzori (Sharpe)

Mesopicos ruwenzori Sharpe, 1902, Bull. Brit. Orn. Club. **13**, p. 8: Ruwenzori Mountains.

♂ (M.C.Z. 278736) Nyika Plateau. 2.xi.48.

Benson (1940, p. 432) records this race from many localities in northern Nyasaland.

Breeding. Testes very small.

ALAUDIDAE

Mirafra africana nyikae Benson

Mirafra africana nyikae Benson, 1939, Bull. Brit. Orn. Club, **59**, p. 85: Nyika Plateau, 8000 feet, Nyasaland.

♂ (M.C.Z. 278737) Nyika Plateau. 30.x.48.

Breeding. Testes large. Benson (1940, p. 583) found nest and eggs in November.

Eremopterix leucotis smithi (Bonaparte)

Pyrrhulauda smithi Bonaparte, 1850, Consp. Gen. Av., **1**, p. 512: South Africa.

♂ ♂ (M.C.Z. 278738–9) near Tete, M. 10–17.i.49.

Native name. Ntolima (Nyungwe).

HIRUNDINIDAE

Riparia cincta suahelica van Someren

Riparia cincta suahelica van Someren, 1922, Nov. Zool., **29**, p. 90: Escarpment, Kenya Colony.

♂ (M.C.Z. 278740) Nyika Plateau. 16.xi.48.

Probably the second authentic *suahelica* to be taken in Nyasaland (cf. Benson, 1951, p. 106).

Hirundo rustica rustica Linné

Hirundo rustica Linné, 1758, Syst. Nat., ed. 10, **1**, p. 191: Europe = Sweden (restricted).

♂ & ? (M.C.Z. 278746–7) near Tete, M. 7.i.49.

Native name. Kandarenya (Nyungwe for swallows).

Hirundo atrocaerulea Sundevall

Hirundo atrocaerulea Sundevall, 1850, Oefv. K. Sv. Vet.-Akad. Förh., **7**, p. 107: "Caffraria inferiore" type from Umvoti, Natal.

2 ♂♂, 1 ♀ (M.C.Z. 278748–50) Nyika Plateau. 30.x–17.xi.48.

Breeding. Testes large. See Benson (1951, p. 104) regarding nest and eggs collected 17.xi.48.

Hirundo smithii smithii Leach

Hirundo smithii Leach, in Tuckey, 1818, Voy. R. Zaire, App., p. 407: Chisalla Island, lower Congo, Belgian Congo.

♂ ♀ (M.C.Z. 278751–2) near Tete, M. 7.i.49.

Native name. Kandarenya (Nyungwe, for swallows).

Pseudohirundo griseopyga griseopyga Sundevall

Hirundo griseopyga Sundevall, 1850, Oefv. K. Sv. Vet.-Akad. Förh., **7**, p. 107: Port Natal, i.e. Durban, Natal.

♂♂ (M.C.Z. 278741–2) Misuku Mtns. 5.x.48.

Native name. Kavileviswa (Misuku, for swallows).

Psalidoprocne orientalis orientalis Reichenow

Psalidoprocne petiti orientalis Reichenow, 1889, Journ. f. Orn., **37**, p. 277: Lewa, Usambara District, Tanganyika Territory.

♂♂ (M.C.Z. 278744–5) Ruo R., Mlanje Mtns. 8.iv.49.

Sclater (1930, p. 588) was in error in placing this particular Lewa in Dodoma District. Neumann locates it in Usambara when describing *Ploceus ocularius suahelicus* of which it is the type locality.

Psalidoprocne albiceps Sclater

Psalidoprocne albiceps P. L. Sclater, 1864, Proc. Zool. Soc. London, p. 108, pl. xiv: "Uzinza i.e. Uvinza", Tabora District, Tanganyika Territory.

♂ (M.C.Z. 278743) Misuku Mtns. 15.x.48.

The junior author has ventured to amend the type locality. In his copy of Speke's "Journal of Discovery" this well-known locality certainly appears as "Uzinza" (pp. 107, 142), but in the Index as "Uzuiza."

Native name. Kavileviswa (Misuku, but not specific).

DICRURIDAE

Dicrurus adsimilis adsimilis (Bechstein)

Corvus adsimilis Bechstein, 1794, Allgem. Uebers. Vögel, **2**, p. 362: South Africa.

3 ♂♂ (M.C.Z. 278753-5) near Tete, M. 10–25.i.49.

Native name. Ntengu (Nyungwe).

The ♂♂ in immature plumage were shot on January 10th, the adult at dusk when calling "tu-whit" in a mango tree.

Dicrurus ludwigii ludwigii (Smith)

Edolius Ludwigii A. Smith, 1834, S. Afr. Quart. Journ. (2), p. 144: "Port Natal," i.e. Durban, Natal.

♀ (M.C.Z. 278756) Cholo Mountain. 22.iii.49.
♂ (M.C.Z. 278757) Ruo R., Mlanje Mtn. 1.iv.49.

ORIOLIDAE

Oriolus auratus notatus Peters

Oriolus notatus Peters, 1868, Journ. f. Orn., **16**, p. 132: Tete, Mozambique.

♂♂ (M.C.Z. 278758–9) near Tete, M. 12.i.49.

Native name. Changala (Nyungwe).

Breeding. Testes small, though the birds appeared to be courting.

TIMALIIDAE

Turdoides jardinei kirkii (Sharpe)

Crateropus kirkii Sharpe, in Layard, 1876, Bds. S. Africa, ed. 2, p. 213: "Zambesi country," type in Brit. Mus. from "Mazzaro."

♀ (M.C.Z. 278760) Chitala River. 14.xii.48.
♀♀ (M.C.Z. 278761–2) Mtimbuka. 21.ii–2.iii.49.

Native name. Namguroro (Yao).

Breeding. In mid-December, ova enlarging.

PYCNONOTIDAE

Pycnonotus barbatus micrus Oberholser

Pycnonotus layardi micrus Oberholzer, 1905, Proc. U. S. Nat. Mus., **23**, p. 891: Taveta, Kenya Colony.

♀ (M.C.Z. 278763) Nchisi Mtn. 27.xi.48.

Also taken on Nchisi by Vincent (1935, p. 358) who discusses range and area of intermediates. Peters treated *micrus* as a race of *tricolor* but both Chapin and Benson consider *barbatus* as more appropriate.

Native name. *Pumbwa* (Chewa).

Phyllastrephus terrestris suahelicus Reichenow

Phyllastrephus capensis suahelicus Reichenow, 1904, Vög. Afr., **3**, p. 405: Msua, Bagamoyo District, Tanganyika Territory.

Phyllastrephus capensis intermedius Gunning & Roberts, 1911, Ann. Transvaal Mus., **3**, p. 115: Umbelluzi River, Mozambique.

2 ♂♂, 2 ♀♀ (M.C.Z. 278764–7) near Tete, M. 10–21.i.49.

These skins were compared with near topotypes of *suahelicus* as well as with a paratype of *intermedius* in the British Museum. Noome is the name of the collector (cf. Roberts, 1917, Ann. Trans. Mus., **5**, p. 259), not the type locality as given in Sclater (1930, p. 382, footnote).

Phyllastrephus flavostriatus vincenti Grant & Praed

Phyllastrephus flavostriatus vincenti Grant & Praed, 1940, Bull. Brit. Orn. Club, **60**, p. 62: Namuli Mountain, Quelimane Province, Mozambique.

♀ (M.C.Z. 278768) Chiradzulu Mtn. 26.viii.48.
♀ (M.C.Z. 278769) Cholo Mtn. 22.iii.49.
♀ (M.C.Z. 278770) Ruo R., Mlanje Mtn. 31.iii.49.

It is but fair to state that the senior author referred these skins to *P. f. tenuirostris* (Fischer & Reichenow) of Lindi, Tanganyika Territory, in the absence of comparative material of *vincenti*.

Phyllastrephus flavostriatus alfredi (Shelley)

Bleda alfredi Shelley, 1903, Bull. Brit. Orn. Club, **13**, p. 61: Mwenembe, 7500 feet, Nyika Plateau, Nyasaland.

♀ (M.C.Z. 278771) Nyika Plateau. 2.xi.48.

Benson (1951, p. 93) gives detailed reasons for regarding *alfredi* as a race of *flavostriatus* (Sharpe).

Phyllastrephus fischeri placidus (Shelley)

Xenocichla placida Shelley, 1889, Proc. Zool. Soc. London, p. 363; Kilimanjaro, 6000 feet, Tanganyika Territory.

♀ (M.C.Z. 278772) Misuku Mtns. 1.x.48.
2 ♂♂, 1 ♀ (M.C.Z. 278773–5) Cholo Mtn. 19–23.iii.49.

Native name. Chipic (Misuku, but not generic).

Arizelocichla tephrolaema fusciceps (Shelley)

Xenocichla fusciceps Shelley, 1893, Ibis, p. 13: "Milanji" i.e. Mlanje Plateau, 4000 to 6000 ft., Nyasaland.

5 ♂♂, 1 ♀ (M.C.Z. 278776–81) Lichenya Plateau. 10–19.viii.48.
♀ (M.C.Z. 278782) Zomba Plateau. 8.ix.48.
♀ ♀ (M.C.Z. 278783–4) Nyika Plateau. 1–9.xi.48.

The Lichenya series are topotypes from 6000 ft. on Mlanje for Vincent (1935, p. 368) considered the original altitude probably too low. Delacour (1943, Zoologica, **28**, p. 23) considers *Arizelocichla* a synonym of *Andropadus* and then only a subgenus of *Pycnonotus;* for the present we have followed Sclater.

Breeding. For nest and eggs collected 1.xi.48, see Benson (1951, p. 94) under *A. tephrolaema fusciceps.*

Arizelocichla milanjensis striifacies (Reichenow & Neumann)

Xenocichla striifacies Reichenow & Neumann, 1895, Orn. Monatsb., **3**, p. 74: Marangu, Kilimanjaro Mtn., Tanganyika Territory.

♂ (M.C.Z. 278785) Misuku Mtns. 15.x.48.

Native name. Ukorokoro (Misuku).

Arizelocichla masukuensis masukuensis (Shelley)

Andropadus masukuensis Shelley, 1897, Ibis, p. 534: "Masuku" i.e. Misuku Mtns., 7000 ft., Nyasaland.

♀ (M.C.Z. 278786) Misuku Mtns. 29.ix.48.

Native name. Chipic (Misuku, but not even generic).

Breeding. On October 4, situated in a bramble-bracken thicket within two feet of the ground just inside Matipa Forest, I flushed a bulbul, apparently of this species, from a cup-shaped nest. The nest measured about 90 x 90 mm. by 60 mm. deep, and was formed of fibres trimmed with green moss and lined with grasses. It held two eggs measuring *ca.* 22 x 15 mm., one quite fresh, the other near hatching,

of a white or pinkish white ground color heavily blotched with chocolate brown and a little mauve; the brown especially thick around the larger pole.

Benson (1949, Ann. Transvaal Mus., **21**, p. 169) concurs that this clutch agrees with that of *masukuensis*, but also with the eggs of *Phyllastrephus fischeri*, a race of which also occurs in Matipa Forest.

Chlorocichla flaviventris occidentalis Sharpe

Chlorocichla occidentalis Sharpe, 1881, Cat. Bds. Brit. Mus., **6**, p. 113, pl. viii: Angola.

4 ♂♂, 2 ♀♀ (M.C.Z. 278787–92) near Tete, M. 19.i.49.

All shot from one tree where they were feeding on ripening berries. For discussion about intermediates, see Vincent (1935, p. 372).

Native name. *Changala* (Nyungwe).

Andropadus virens zombensis Shelley

Andropadus zombensis Shelley, 1894, Ibis, p. 10: Zomba, Nyasaland.

♂♂ (M.C.Z. 278793–4) Misuku Mtns. 29.ix–9.x.48.

Regarded by Sclater (1930, p. 395) as a synonym of *Eurillas virens* Cassin of the Gaboon, with *E. v. virens* in northern (Benson, 1940, p. 594), and *v. zombensis* in southern (Benson, 1951, p. 94) Nyasaland. But Benson points out that Grant & Praed (1940, Bull. Brit. Orn. Club, **60**, p. 64) now refer all Nyasaland birds to *v. zombensis*.

Native name. *Chipie* (Misuku, but not even generic).

TURDIDAE

Turdus libonyanus tropicalis Peters

Turdus tropicalis Peters, 1881, Journ. f. Orn., **29**, p. 50: Inhambane, Mozambique.

♂ ♀ (M.C.Z. 278795–6) near Tete, M. 14–21.i.49.

Native name. *Jigu* (Nyungwe).

Breeding. In worn breeding plumage.

Turdus olivaceus nyikae Reichenow

Turdus nyikae Reichenow, 1904, Orn. Monatsb., **12**, p. 95: Nyika Plateau, Nyasaland.

♀ (M.C.Z. 279080) Nyika Plateau. 30.x.48.

Breeding. See Benson (1951, p. 97) regarding nest and eggs collected.

Geokichla gurneyi gurneyi (Hartlaub)

Turdus gurneyi Hartlaub, in Gurney, 1864, Ibis, p. 350, pl. ix, near Pietermaritzburg, Natal.

♀ ♀ (M.C.Z. 278797) Nyika Plateau. 2–6.xi.48.

These birds do not differ from an example of typical *gurneyi* from Pondoland in size of bill. *Vide* Vincent (1935, pp. 487-8). Benson (1950, Ostrich, p. 29) also refers Nyika birds to the nominate form.

Breeding. On November 6, ova enlarged.

Geokichla litsipsirupa stierlingi Reichenow

Geocichla litsitsirupa stierlingi Reichenow, 1900, Orn. Monatsb., **8**, p. 5: Iringa, s.w. Tanganyika Territory.

♀ (M.C.Z. 278799) Vipya Plateau. 17.ix.48.

Native name. Mwilo (Misuku); *pipiyo* (Ngoni); *pingoli* (Timbuka).

Benson informs us that the occurrence of this bird on the Vipya Plateau is unusual for it is normally an inhabitant of the *Brachystegia* woodland at 3000 to 5000 feet.

Monticola angolensis Sousa

Monticola angolensis Sousa, 1888, Jorn. Sci. Lisboa, **12**, pp. 225, 233: Caconda, Angola.

♂ ♂ (M.C.Z. 278801–2) Chiradzulu Mtn. 28–31.viii.48.

Oenanthe oenanthe oenanthe (Linné)

Motacilla Oenanthe Linné, 1758, Syst. Nat., ed. 10, **1**, p. 186: Europe = Sweden (restricted).

imm. ♂ (M.C.Z. 278800) Nyika Plateau. 27.x.48.

Breeding. Gonads small in this winter migrant. See also Benson (1951, p. 97).

Saxicola torquata caffra Keyserling & Blasius

Saxicola Rubicola var. *Caffra* Keyserling & Blasius, 1840, Die Wirbelthiere Europa's **1**, p. lix: South Africa (in Berlin Museum).

Pratincola torquata orientalis W. L. Sclater, 1911, Ibis, p. 409: Umfolosi Station, Zululand.

♀ (M.C.Z. 278803) Zomba Plateau. 8.ix.48.

♂ ♀ (M.C.Z. 278804, 279081) Nyika Plateau. 3–6.xi.48.

Benson invites our attention to Vincent's (1949, Ostrich, p. 19) note

on the use of this name which even antedates *robusta* (Tristram, 1870), regarded as indeterminate (but cf. Meinertzhagen, 1945, Ibis, pp. 290–291).

Breeding. In November, gonads enlarged. See Benson (1951, p. 99) regarding nest and eggs collected.

Cossypha caffra iolaema Reichenow

Cossypha caffra iolaema Reichenow, 1900, Orn. Monatsb., **8**, p. 5: East Africa, i.e. Kilimanjaro, *fide* Gyldenstolpe.

♂ (M.C.Z. 278805) Lichenya Plateau. 19.viii.48.
♂ ♀ (M.C.Z. 278806–7) Zomba Plateau. 7–10.ix.48.
♂ ♀ (M.C.Z. 278808–9) Nyika Plateau. 1–8.xi.48.

Breeding. On November 8, ova enlarged though bird brooding. On November 13 Benson (1951, p. 98) found one nesting on Vipya Plateau.

Bessonornis anomala macclounii (Shelley)

Callene macclounii Shelley, 1903, Bull. Brit. Orn. Club, **13**, p. 61: "Nwenembe," misprint for Mwenembe, 7500 feet, Nyika Plateau, Nyasaland.

♀ (M.C.Z. 278810) Nyika Plateau. 29.x.48.

This Nyika White-throated Robin-Chat was obtained near my camp, just two miles south of the type locality. For its relationship to *anomala* see Moreau (1950, Ibis, p. 642).

Cichladusa arquata Peters

Cichladusa arquata Peters, 1863, Monatsb. Akad. Wiss. Berlin, p. 134: Sena, Zambezi River, Mozambique.

2 ♂♂, 2 ♀♀ (M.C.Z. 278811–4) Mtimbuka. 11.ii–2.iii.49.

Native name. Lumbusi (Yao).

Pogonocichla stellata orientalis (Fischer & Reichenow)
(Plate 2, figure 2)

Tarsiger orientalis Fischer & Reichenow, 1884, Journ. f. Orn., p. 57: Pangani River, Tanganyika Territory.

Pogonocichla johnstoni Shelley, 1893, Ibis, p. 18: "Mlianji" i.e. Mlanje Plateau, Nyasaland.

♀ (M.C.Z. 278815) Zomba Plateau. 10.ix.48.
2 ♂♂, 3 ♀♀ (M.C.Z. 278816–21) Misuku Mtns. 29.ix.–2.x.48.
♂ (M.C.Z. 278822) Nyika Plateau. 3.xi.48.

The series was identified with *orientalis* in the field by Benson who formerly (1940, p. 614) referred birds from these localities to *johnstoni*, now regarded as a synonym (cf. Moreau, 1951, Ibis, p. 385).

Native name. *Natangere* (Misuku).

Breeding. On October 1 a White-starred Bush-robin was sitting on two eggs in a nest built among drifted leaves and sprays of bramble covering a clearing in an outlying patch of Matipa Forest. On the same date a bird in immature plumage was collected. Another of these robins was found dead in a snap-back trap set for mice.

SYLVIIDAE

Phylloscopus trochilus trochilus (Linné)

Motacilla Trochilus Linné, 1758, Syst. Nat., ed. 10, **1**, p. 188: Europe = England (restricted).

4 ♂♂ (M.C.Z. 278823–6) near Tete, M. 7–11.i.49.

Vincent (1935, p. 508) with reservations, tentatively refers his willow-warblers, taken at Tete in March, to *P.t. eversmanni* (Bonaparte), now generally regarded as synonymous with *P.t. acredula* (Linné), see Benson (1940, p. 616). Chapin writes (13.v.52) that while he feels "sure that many *P.t. acredula* migrate to eastern Africa, it is extremely difficult to recognize them in winter condition." After drawing attention to the fact that three of our four Tete birds are in moult, he states that he sees no evidence of any being *acredula* but considers that all are *P.t. trochilus*. The latter is a subspecies whose "upper parts in breeding plumage are slightly greenish, breast dull pale yellow, and wings of 61–71.5 mm., those of the ♀♀ being smaller than those of the ♂♂, which, in the four Tete ♂♂ are 67–69 mm."

Native name. *Timba* (Nyungwe).

Seicercus ruficapilla johnstoni Sclater

Seicercus ruficapilla johnstoni W. L. Sclater, 1927, Bull. Brit. Orn. Club, **48**, p. 13: "Kombi, Masuka Range" i.e. Misuku Mtns., Nyasaland.

♀ (M.C.Z. 278827) Zomba Plateau. 6.ix.48.
♀♀ (M.C.Z. 278828–9) Misuku Mtns. 23.ix–5.x.48.
♀ (M.C.Z. 278830) Nyika Plateau. 9.xi.48.

Native name. *Kaiyera* (Misuku).

Breeding. In November, ova small.

Bradypterus cinnamomeus nyassae Shelley

Bradypterus nyassae Shelley, 1893, Ibis, p. 16: "Milanji" i.e. Mlanje Plateau, 6000 ft., Nyasaland.

3 ♂♂, 4 ♀♀ (M.C.Z. 278831–7) Nyika Plateau. 28.x–13.xi.48.

This identification, originally made in the field by Benson, has been confirmed by Chapin, who remarks that as these warblers appear to be in very worn breeding dress they are consequently less rufous on the upper parts, chest and flanks than two Rungwe birds (A.M.N.H.) which are in fresh plumage, having been taken in June.

"From the presence of very short outer retrices in all but one of the series," Chapin concludes that all except one would develop twelve quills in the tail. The one in question, a ♀, "shows a very short outermost quill on one side so it cannot be referable to *mariae*. In some regions *cinnamomeus* very often has only ten. Differences in the number of tail quills is not a generic character and I do not regard *Sathrocercus* as a valid genus."

Breeding. On November 6, testes large in one ♂, small in two others; ova small in two ♀♀.

Bradypterus mariae usambarae Reichenow

Bradypterus usambarae Reichenow, 1917, Journ. f. Orn., **65**, p. 391: Usambara Mtns., Tanganyika Territory.

♀ (M.C.Z. 278838) Nyika Plateau. 6.xi.48.

Of this bird Chapin writes on 19.iv.52: "It is often hard to count the tail-quills in these birds. *B. m. usambarae* should have only ten. Your specimen has nine, having lost the outermost one on the right side. I have compared it with two birds from Rungwe and two from Usambara. It is just a trifle more rufous on crown and back than the Rungwe birds but can almost be matched by one from the Usambara. I am a little surprised that there are no dusky shaft-streaks on the fore-neck of the Nyika bird, but that character is variable. I think it best to call it *B. m. usambarae* for, according to Benson (1939, p. 110) the race *granti*, which extends north supposedly to the Vipya Plateau, is still more ruddy. It seems likely that the whole *mariae* group may yet be considered conspecific with *B. barratti*." See also Benson (1940, p. 618).

Apalis murina murina Reichenow

Apalis murina Reichenow, 1904, Orn. Monatsb., **12**, p. 28: Mararupia, Ruvuma River Valley, Tanganyika Territory.

3 ♂♂ (M.C.Z. 278861–3) Misuku Mtns. 2–14.x.48.

Native name. Masakagakia (Misuku).

APALIS MURINA YOUNGI Kinnear

Apalis thoracica youngi Kinnear, 1936, Bull. Brit. Orn. Club, **57**, p. 8: Vipya Plateau, 6000 feet, Nyasaland.

3 ♂♂ (M.C.Z. 278864–6) Nyika Plateau. 3–11.xi.48.

This and related forms were removed from *thoracica* (Shaw & Nodder) by Mackworth-Praed & Grant (1938, Ibis, pp. 528–533).

Breeding. Testes enlarged or slightly enlarged.

APALIS FLAVIGULARIS FLAVIGULARIS Shelley

Apalis flavigularis Shelley, 1893, Ibis, p. 16: "Milanji" i.e. Mlanje Plateau, Nyasaland.

5 ♂♂ (M.C.Z. 278867–71) Lichenya Plateau. 8–19.viii.48.
♂ ♀ (M.C.Z. 278872–3) Zomba Plateau. 7–8.ix.48.
♂ (M.C.Z. 278874) Ruo R., Mlanje Mtn. 31.iii.49.

The Lichenya series are topotypes of the Yellow Bar-throated Warbler. The describing of *lynesi* Vincent from Namuli Mtn. renders trinomials necessary.

APALIS MELANOCEPHALA LIGHTONI Roberts

Apalis chirindensis lightoni Roberts, 1938, Ostrich, **9**, p. 119: Zimbiti near Beira, Mozambique.

♂ (M.C.Z. 278875) Chiradzulu Mtn. 30.viii.48.
♂ (M.C.Z. 278876) Zomba Plateau. 9.ix.48.

In the absence of comparative material we follow Benson (1951, p. 101) in referring these birds to *lightoni*.

SYLVIETTA RUFESCENS PALLIDA Alexander

Sylviella (sic) pallida Alexander, 1899, Bull. Brit. Orn. Club, **8**, p. 48: Zambezi River between Tete and Chicowa, Mozambique.

♂ (M.C.Z. 278877) Mtimbuka. 9.ii.49.

Wing 57 mm., outer primary 34 mm. We are indebted to C. W. Benson for suggesting the correct determination of this crombec, and to Major Claude Grant for checking it by comparing with material in the British Museum. Benson (1940, p. 626; 1942, p. 315) found *S. whytii jacksoni* along the lakeshore to the north at Nkata Bay, north of Kotakota, etc.

CAMAROPTERA BRACHYURA BORORENSIS Gunning & Roberts

Camaroptera brachyura bororensis Gunning & Roberts, 1911, Ann. Transvaal Mus., **3**, p. 117: Ngamwe, Boror, Mozambique.

♂ (M.C.Z. 278878) Ruo R., Mlanje Mtn. 31.iii.49.

Chloropeta natalensis natalensis Smith

Chloropeta natalensis A. Smith, 1847, Ill. Zool. S. Africa, Aves, pl. cxii, fig 2: "Port Natal," i.e. Durban, Natal.

♂ (M.C.Z. 278887) Nchenachena. 22.xi.48.

From its locality Benson suspects that this bird is probably something of an intermediate with *massaica*. Chapin feels certain that this genus should be transferred from the Muscicapidae to the Sylvidae with affinities near *Calamocichla* and *Acrocephalus*.

Breeding. Testes very small.

Cisticola lais semifasciata Reichenow

Cisticola semifasciata Reichenow, 1905, Vög. Afr., **3**, p. 541: Tandala, Ukinga Mountains, Tanganyika Territory.

♀ + 3? (M.C.Z. 278851–4) Lichenya Plateau. 8–11.viii.48.

These grass-warblers were submitted to Chapin, who says the two larger birds are ♂♂, the two smaller ones ♀ ♀, adding that he "has compared them with others collected at 6000 feet on Mlanje by Boulton" and finds that all are *C. l. semifasciata* which, according to Belcher (1925, p. 808) is the only species of *Cisticola* occurring on Lichenya Plateau. A conclusion supported by Vincent's (1935, p. 709) collecting on Mlanje.

Cisticola njombe mariae Benson

Cisticola lais mariae Benson, 1945, Bull. Brit. Orn. Club, **66**, p. 16: n. n. for *C. l. nyikae* Benson (not of Lynes), 1941, Ostrich, **12**, p. 28: Nyika Plateau, Nyasaland.

5 ♂♂, 2 ♀ ♀ (M.C.Z. 278839) Nyika Plateau. 30.x–12.xi.48.

Breeding. On November 10–12, testes were small, moderate, and large; ova very slightly enlarged.

Cisticola chiniana emendata Vincent

Cisticola chiniana emendata Vincent, 1944, Bull. Brit. Orn. Club, **64**, p. 63: Mirrote, 900 feet, Mozambique Province, Mozambique.

2 ♂♂, 2 ♀ ♀ (M.C.Z. 278846–9) Mtimbuka. 7.ii–2.iii.49.

The reasons why Vincent proposed *emendata* in lieu of *mocuba* Vincent, 1933, is given in the above citation.

Cisticola chiniana procera Peters

Cisticola procera Peters, 1868, Journ. f. Orn., **16**, p. 132: Tete, Zambezi River, Mozambique.

♀ (M.C.Z. 278850) near Tete, M. 21.i.49.

Shot at Kasumbadedza Village, 5 miles west of Tete.

Cisticola nigriloris Shelley

Cisticola nigriloris Shelley, 1897, Ibis, p. 536, pl. xii, fig. 2: "Kombi, Masuku" i.e. Misuku Mtns., Nyasaland.

♀ (M.C.Z. 278855) Misuku Mtns. 15.x.48.

2 ♂♂, 1 ♀ (M.C.Z. 278856–8) Nyika Plateau. 11–17.xi.48.

Native name. *Nkeena* (Misuku).

Breeding. In November, testes moderate to small; ova also small.

Cisticola cantans münzneri Reichenow

Cisticola münzneri Reichenow, 1916, Journ. f. Orn., **64**, p. 163: Sanya, Mahenge, Tanganyika Territory.

♂ (M.C.Z. 278859) Chiradzulu Mtn. 30.viii.48.

Bill 13 mm.; wing 51.8 mm., tail 52.6 mm.

Cisticola natalensis katanga Lynes

Cisticola natalensis katanga Lynes, 1930, Ibis, Suppl. p. 443: Kambove, 4500 ft., Haut Luapula District, S.E. Belgian Congo.

♀ (M.C.Z. 278860) Misuku Mtns. 11.x.48.

Native name. *Mpeta* (Misuku: but Benson suggests confusion with *Euplectes* or *Coliuspasser*).

MUSCICAPIDAE

Muscicapa striata striata (Pallas)

Motacilla striata Pallas, in Vroeg, 1764, Cat., Adumbr., p. 3: Holland.

♀ (M.C.Z. 278879) Mtimbuka. 28.ii.49.

Alseonax adustus subadustus Shelley

Alseonax subadusta Shelley, 1897, Ibis, p. 542: Nyika Plateau, 6000 feet, Nyasaland.

♀ (M.C.Z. 278880) Slopes of Nyika at 5000 feet. 19.xi.48.

♂ ♀ (M.C.Z. 278881–2) Nchenachena at 4200 feet. 22.xi.48.

Breeding. Testes large; but ova small in both ♀ ♀.

Alseonax cinereus cinereola (Finsch & Hartlaub)

Muscicapa cinereola Finsch & Hartlaub, 1870, Vög. Ost.-Afr., **4**, p. 302, pl. iv, fig. 1: Usaramo, Tanganyika Territory.

Alseonax caerulescens kikuyuensis van Someren, 1921, Bull. Brit. Orn. Club, **41**, p. 102: Kyambu Forest, 5000–6000 feet, Kenya Colony.

♀ (M.C.Z. 278883) Likabula River. 1.viii.48.

Dr. Chapin writes (29.v.52) that he believes *cinereola* should take precedence over *kikuyuensis*.

Dioptrornis chocolatinus nyikensis (Shelley)

Muscicapa nyikensis Shelley, 1899, Bull. Brit. Orn. Club, **8**, p. 35: Nyika Plateau, 6000–7000 feet, Nyasaland.

♀ ♀ (M.C.Z. 278884–5) Misuku Mtns. 5–11.x.48.

Reasons for using *chocolatinus* in preference to *fischeri*, will be found in Benson (1946, Ibis, p. 181).

Native name. *Namasundo* (Misuku).

Melaenornis pammelaina pammelaina (Stanley)

Sylvia pammelaina Stanley, in Salt, 1814, Voy. Abyssinia, App., p. 59: probably Mozambique.

♂ (M.C.Z. 278886) near Tete, M. 20.i.49.

Native name. *Kajuba* (Nyungwe).

Hyliota flavigaster barbozae Hartlaub

Hyliota Barbozae Hartlaub, 1883, Journ. f. Orn., **31**, p. 329: Caconda, Benguela, Angola.

♂ (M.C.Z. 278888) Nyika Mtns. at 5000 feet. 18.xi.48.

Breeding. Testes large.

Batis capensis erythrophthalma Swynnerton

Batis erythrophthalma Swynnerton, 1907, Bull. Brit. Orn. Club, **19**, p. 109: Chirinda Forest, 3900 feet, Southern Rhodesia.

♂ ♀ (M.C.Z. 278889–90) Zomba Plateau. 6.ix.48.

Benson suggests that these puffback flycatchers should also be referred to *B. c. dimorpha*, but Peters paid particular attention to these skins. It might be added that a small sylvicoline skink and frog from Chirinda Forest, Selinda Mtn., also occur on Mlanje Plateau.

Batis capensis dimorpha (Shelley)

Pachyprora dimorpha Shelley, 1893, Ibis, p. 18: "Milanji" i.e. Mlanje Plateau, Nyasaland.

♂ (M.C.Z. 278891) Lichenya Plateau. 10.viii.48.
♀ (M.C.Z. 278892) Misuku Mtns. 5.x.48.

Benson (1949, Ann. Transvaal Mus., **21**, p. 169) records a Misuku bird as *B. c. mixta* (Shelley) and suggests that this bird should be that form.

Native name. *Sansa* (Misuku).

Breeding. On October 6, one ovule very large.

Batis molitor soror Reichenow

Batis puella soror Reichenow, 1903, Vög. Afr., **2**, p. 485: Quelimane, Mozambique.

"♀" (M.C.Z. 278893) Likabula River. 1.viii.48.
"♀" (M.C.Z. 278894) Chiradzulu Mtn. 30.viii.48.
"♀" (M.C.Z. 278895) near Tete, M. 13.i.49.

All three apparently mis-sexed ♂ by the African skinner. Wings 54; 53; and 53.9 mm.

Platysteira peltata peltata Sundevall

Platystira peltata Sundevall, 1850, Oefv. K. Vet.-Akad. Förh., **7**, p. 105: "Caffraria inferiore," type from Umlezi River, near Durban, Natal.

♀ (M.C.Z. 278896) Chiradzulu Mtn. 30.viii.48.
♂ (M.C.Z. 278897) near Tete, M. 20.i.49.

Native name. *Mwankanganyisa* (Nyungwe).

Elminia albicauda kivuensis Grote

Elminia albicauda kivuensis Grote, 1922, Journ. f. Orn., **70**, p. 485: "Kwidschwi" i.e. Idjwi Island, Lake Kivu, Belgian Congo.

♂ ♀ (M.C.Z. 278898–9) Nchenachena. 20.xi.48.

As *E. longicauda kivuensis* Benson (1942, p. 309). Dr. Chapin observes (29.v.52) that *Elminia*, not being preoccupied by *Elminius* (Crustacea), remains valid and should not be replaced by *Erranornis*. He considers *albicauda* specifically distinct from *longicauda*, but questions the validity of *kivuensis*.

Breeding. Testes moderately large; ova enlarged.

Trochocercus albonotatus albonotatus Sharpe

Plate 2, figure 1

Trochocercus albonotatus Sharpe, 1891, Ibis, p. 121: Mt. Elgon.

♂ (M.C.Z. 278900) Lichenya Plateau. 8.viii.48.
♂ (M.C.Z. 278901) Zomba Plateau. 8.ix.48.
♀ (M.C.Z. 278902) Misuku Mtns. 1.x.48.
2 ♂♂, 1 ♀ (M.C.Z. 278903; 279082–3) Nyika Plateau. 11–18.xi.48.

Native name. Mwankilafuka (Misuku).

Breeding. In November testes large; on the 18th two nestlings (pl. 2, fig. 1) were brought to camp by one of the carriers who had come to take our loads down the Nyika. Had it been possible I would have had them returned; they are now M.C.Z. 279082–3.

Terpsiphone viridis plumbeiceps Reichenow

Terpsiphone plumbeiceps Reichenow, in Werther, 1898, Mittl. Hochl. Deutsch-Ost-Afrika, p. 275: Milange, Angola.

♂ (M.C.Z. 278904) near Tete, M. 11.i.49.

Native name. Zuze (Nyungwe).

Pseudoalcippe stierlingi stictigula (Shelley)

Alcippe stictigula Shelley, 1903, Bull. Brit. Orn. Club, **13**, p. 61: Mwenembe, 7500 feet, Nyika Plateau, Nyasaland.

♂♂ (M.C.Z. 278905–6) Nyika Plateau. 3–9.xi.48.

Nesting. Testes large. See Benson (1951, p. 92) regarding nest and eggs collected 3.xi.48.

MOTACILLIDAE

Motacilla aguimp vidua Sundevall

Motacilla vidua Sundevall, 1850, Oefv. K. Vet.-Akad. Förh., **7**, p. 128: "Syene," i.e. Assouan, Upper Egypt.

♂ (M.C.Z. 278907) near Tete, M. 22.i.49.

Native name. Zambezi (Nyungwe, who considered *M. f. luteus* was its mate).

Habits. "The lorry, which has been parked to one side of the front lawn for five days, had not been there long when I disturbed a Pied Wagtail on the bonnet. During succeeding days I realized that I rarely approached or passed the vehicle without a wagtail flying off the hood. Today I counted the white droppings that disfigure the gleaming green paint and found they number about fifty. I remarked

on this to our host and he replied that he thought it was well known that wagtails like to perch on the bonnets of cars, presumably to see their own reflections.

"Pointing to a much white-washed section of the veranda rail, Mr. Haskard went on to say that it was the favorite perch of a wagtail, one of the pair that haunt his house and garden. From this stance the bird flies against the third pane, never any other, of the lounge window, taps the glass with its beak and then returns to the rail. One day the wagtail repeated this performance about twenty times. Thinking the bird possibly wished to come in, Haskard rose from his desk and opened the casement, whereupon the wagtail flew away. Haskard decided that from where it sat on the rail the bird could see its own reflection in the third pane only and possibly mistook it for a rival." (Chiradzulu Mtn., 30.viii.48).

Motacilla flavus luteus (Gmelin)

Parus luteus S. G. Gmelin, 1774, Reise d. Russland, **3**, p. 101, pl. xx, fig. 1: Astrakan, Caspian Sea, U.S.S.R.

Motacilla campestris Pallas, 1776, Reise Versch. Prov. Russ. Reichs, **3**, Anhang, p. 696: S. Russia and Siberia.

♂♂ (M.C.Z. 278908–9) near Tete, M. 22.i.49.

Native name. Zambezi (Nyungwe, but not specific).

We are indebted to Dr. Chapin (29.v.52) for pointing out that *luteus* has priority over *campestris*.

Anthus richardi lacuum Meinertzhagen

Anthus richardi lacuum Meinertzhagen, 1920, Bull. Brit. Orn. Club, **41**, p. 22: Lake Naivasha, Kenya Colony.

♂ (M.C.Z. 278910) near Tete, M. 22.i.49.

Native name. Tanganyika (Nyungwe).

This identification by Peters was subsequently checked by the junior author who found the pale Tete bird apparently identical with a ♀ (M.C.Z. 134105) from Ngong, Kenya Colony; and a pair (M.C.Z. 134109–10) I collected at Lumbo, Mozambique, referred to *raaltenii* by Friedmann and Loveridge (1937, Bull. Mus. Comp. Zool., **81**, p. 297). Chapin (29.v.52) writes that *lacuum* allegedly ranges south to the mouth of the Zambezi.

Anthus richardi lichenya Vincent

Anthus richardi lichenya Vincent, 1933, Bull. Brit. Orn. Club, **53**, p. 131: Mlanje Mtn. at 6000 feet, Nyasaland.

♂ ♀ (M.C.Z. 278914–5) Lichenya Plateau. 10.viii.48.
♀ (M.C.Z. 278916) Nyika Plateau. 2.xi.48.

The Lichenya birds are topotypic. Benson (1940, p. 587) considers this name applicable to *all* Nyasaland *richardi* from whatever altitude, while *A. r. lacuum* are extralimital to the north and *A. r. raalteni* extralimital to the south.

Breeding. See Benson (1951, p. 92) regarding nest and eggs collected on 3.xi.48.

Anthus richardi ? raalteni Layard

Anthus raalteni Layard, 1867, Birds S. Afr., p. 123: Swellendam, South Africa.

♂♂ (M.C.Z. 278911–2) Misuku Mtns. 11–15.x.48.
imm. ♀ (M.C.Z. 278913) Nchisi Mtn. 27.xi.48.

The immature Nchisi bird closely resembles an immature Pretoria bird in the collection, but all three differ from Mlanje and Nyika *lichenya* in having the light portion of the outer tail feathers isabelline rather than whitish.

Native name. Nichikula (Misuku); *nchola* (Chewa).

Breeding. On October 15, gonads large.

LANIIDAE

Lanius collaris humeralis Stanley

Lanius humeralis Stanley, in Salt, 1814, Voy. Abyssinia, App., p. 51: Chelicut, Ethiopa.

♀ (M.C.Z. 278917) Nyika Plateau. 28.x.48.

Breeding. Held a large yolked ovum.

Lanius collurio Linné

Lanius collurio Linné, 1758, Syst. Nat., ed. 10, **1**, p. 94: Europe = Sweden (restricted).

♂ (M.C.Z. 278918) Ruo R., Mlanje Mtn. 1.iv.49.
3 ♂♂ (M.C.Z. 278919–21) near Tete, M. 7–11.i.49.

The April European Red-backed Shrike is in fresh plumage.

Native name. Nyambula (Nyungwe, but not generic).

Laniarius fülleborni (Reichenow)

Dryoscopus fülleborni Reichenow, 1900, Orn. Monatsb., **8**, p. 39: "Usafua," i.e. Usafwa, north of Lake Nyasa, Tanganyika Territory.

♀ (M.C.Z. 278922) Misuku Mtns. 29.ix.48.
? (M.C.Z. 278923) Nyika Plateau. 13.xi.48.
Native name. Namankoto (Misuku).

Laniarius ferrugineus mossambicus (Reichenow)

Dryoscopus major mossambicus Reichenow, 1880, Journ. f. Orn., **28**, p. 141: Mozambique.

♂ ♀ (M.C.Z. 278924–5) near Tete, M. 20.i.49.
Native name. Nyambula (Nyungwe, but not generic).

Dryoscopus cubla hamatus Hartlaub

Dryoscopus hamatus Hartlaub, 1863, Proc. Zool. Soc. London, p. 106: "Kazeh," i.e. Tabora, Unyamwezi, Tanganyika Territory.

2 ♂♂, 1 ♀, nestling (M.C.Z. 278926–9) near Tete, M. 7–20.i.49.
Native name. Nyambula (Nyungwe, but not generic).
Parasites. A gray tick was taken from the throat of one shrike.

Tchagra australis congener (Reichenow)

Pomatorhynchus australis congener Reichenow, 1902, Journ. f. Orn., **50**, p. 258: Type in Berlin Mus. from Neu-Helgoland, Songea District, Tanganyika Territory.

♂ (M.C.Z. 278930) Misuku Mtns. ix.48.
♂ (M.C.Z. 278931) near Tete, M. 20.i.49.
Native name. Umangwa (Misuku).
Wings 71 and 73 mm.; tails 83.2 and 81.7 mm. Chapin (29.v.52) points out that *Tchagra*, not *Tschagra*, is the correct spelling of this genus.

Chlorophoneus sulfureopectus similis (Smith)

Melaconotus similis A. Smith, 1836, Rep. Exp. Centr. Afr., p. 44: "Country beyond Kurrichaine," i.e. Rustenburg District, Transvaal.

♂ (M.C.Z. 278932) near Tete, M. 17.i.49.
Native name. Boto (Nyungwe).

Chlorophoneus nigrifrons manningi (Shelley)

Malaconotus manningi Shelley, 1899, Bull. Brit. Orn. Club, **8**, p. 35: (No locality given). Nyasa-Tanganyika Plateau.

♂ (M.C.Z. 278933) Ruo R., Mlanje Mtn. 31.iii.49.

See Vincent (1935, pp. 753–756) for discussion on why he prefers to call this Orange-breasted Bush-Shrike *C. abbotti manningi*.

PRIONOPIDAE

Prionops plumata poliocephala (Stanley)

Lanius poliocephalus Stanley, in Salt, 1814, Voy. Abyssinia, App., p. 50: No locality; Mozambique *apud* Neumann.

2 ♂♂, 2 ♀♀ (M.C.Z. 278934–7) near Tete, M. 13–27.i.49.

Native name. *Nyemi* (Nyungwe).

STURNIDAE

Cinnyricinclus leucogaster verreauxi (Bocage)

Pholidauges verreauxi Bocage, in Finsch & Hartlaub, 1870, Vög. Ost-Afr., p. 867: Caconda, Angola.

♂ ♀ (M.C.Z. 278938–9) Misuku Mtns. 25.ix.48.

Native name. *Nwelwe* (Misuku).

Lamprocolius chalybaeus sycobius Hartlaub

Lamprocolius sycobius Hartlaub, 1859, Journ. f. Orn., **7**, p. 19: Tete, Mozambique.

2 ♂♂, 1 ♀ (M.C.Z. 278940–2) near Tete, M. 12–17.i.49.

Native name. *Mbuluwe* (Nyungwe).

Lamprotornis mevesii mevesii (Wahlberg)

Juida mevesii Wahlberg, 1857, Journ. f. Orn., **5**, p. 1: "Doughe," i.e. Okavango River, Southwest Africa.

♀ (M.C.Z. 278943) near Tete, M. 13.i.49.

Vincent (1936, p. 55) did not meet with this Long-tailed Glossy-Starling anywhere in Tete Province, neither did Benson (1942, p. 325) in West Nyasa.

Native name. *Mbuluwe* (Nyungwe, but not generic).

Onychognathus walleri nyasae (Shelley)

Amydrus nyasae Shelley, 1898, Ibis, p. 557: Nyasaland.

♀ (M.C.Z. 278944) Nyika Plateau. 5.xi.48.

Breeding. Ova small.

Onychognathus tenuirostris raymondi Meinertzhagen

Onychognathus tenuirostris raymondi Meinertzhagen, 1937, Bull. Brit. Orn. Club, **57**, p. 68: Mt. Kenya, 15,000 feet, Kenya Colony.

♂ (M.C.Z. 278945) Nyika Plateau. 1.xi.48.

Chapin informs the junior author that it is generally agreed that *raymondi* and *theresae* are not separable. Unless some reviser has given preference to *theresae* so that Art. 28 of the International Rules is invoked, the name *raymondi* has paragraph preference and should be employed. Possibly this specimen constitutes the first Nyasaland record for the Slender-billed Chestnut-wing.

NECTARINIIDAE

Nectarinia famosa cupreonitens Shelley

Nectarinia cupreonitens Shelley, 1876, Monogr. Nect., p. 17, pl. vi: "Abyssinia," etc. = Ethiopia (restricted).

4 ♂♂ (M.C.Z. 278946–9) Nyika Plateau. 10–16.xi.48.

According to Sclater (1930, p. 682) this bird should be the typical form from S. Africa, but Benson (1942, p. 325) refers a Nyika specimen to *f. aenigularis* of Kenya Colony, now regarded by Grant & Praed (1947, Bull. Brit. Orn. Club, p. 83) as synonymous with *cupreonitens*.

Breeding. Testes large in two birds, moderate in the other two. One was collected with a nest and eggs but there is some doubt as to whether the nest might not have been that of a *salvadorii*.

Nectarinia johnstoni salvadorii Shelley

Nectarinia salvadorii Shelley, 1903, Bull. Brit. Orn. Club, **13**, p. 61: Kachere, 8400 feet, Nyika Plateau, Nyasaland.

4 ♂♂, 4 ♀♀ (M.C.Z. 278950–7) Nyika Plateau. 29.x–16.xi.48.

Breeding. Two of these pairs are the birds whose nests and eggs were referred to by Benson (1951, p. 109) as probably the first of this race ever to be taken. Another nest, found on October 30, contained two hatchlings, now preserved in alcohol. Nesting at 7000 ft. in late October and early November.

Nectarinia kilimensis arturi Sclater

Nectarinia arturi P. L. Sclater, 1906, Bull. Brit. Orn. Club, **19**, p. 30: Wolverhampton, Melsetter District, Southern Rhodesia.

♂ (M.C.Z. 278958) Nchenachena. 20.xi.48.

Breeding. Testes very small; elongated tail feathers only just projecting beyond the rest.

Cinnyris bifasciatus microrhynchus Shelley

Cinnyris microrhyncha Shelley, 1876, Monogr. Nect., p. 219, pl. lxvii: "Zanzibar District." Type in Brit. Mus. from Dar es Salaam, Tanganyika Territory.

3 ♂♂ (M.C.Z. 278959–61) near Tete, M. 7–15.i.49.

Native name. *Songosongo* (Nyungwe for all sunbirds as well as for *Melittophagus p. meridionalis*, which see).

Cinnyris talatala talatala Smith

Cinnyris talatala A. Smith, 1836, Rep. Exp. Cent. Afr., p. 53: between Orange River and Kurrichaine, South Africa.

3 ♂♂, 3 ♀♀ (M.C.Z. 278962–7) near Tete, M. 15–17.i.49.

Native name. As for *C. b. microrhynchus*.

Dr. Chapin informs us (14.iv.52) that the type of *C. leucogaster* Vieillot was found by Hellmayr to be identical with *C. v. venustus* so that *talatala*, which appears specifically distinct from *venustus*, should be used for Tete birds. Trinomials are necessary as typical southern *talatala* are larger than the western and northern forms which are separable as *C. t. anderssoni* (Strickland, 1852, Contrib. Ornith., p. 153), from Okavango River.

Cinnyris venustus falkensteini Fischer & Reichenow

Cinnyris Falkensteini Fischer & Reichenow, 1884, Journ. f. Orn., **32**, p. 56: Lake Naivasha, Kenya Colony.

♂ ♀ (M.C.Z. 278968–9) Zomba Plateau. 4.ix.48.
♂ ♂ (M.C.Z. 278970–1) Misuku Mtns. 14.x.48.
♀ (M.C.Z. 278973) Nchenachena. 20.xi.48.
♂ (M.C.Z. 278972) Ruo R., Mlanje Mtn. 8.iv.49.

Breeding. In mid-November bird, ova very small.

Cinnyris chalybeus bractiatus Vincent

Cinnyris chalybeus bractiatus Vincent, 1933, Bull. Brit. Orn. Club, **53**, p. 146: Fort Chiquaqua, Mashonaland, Southern Rhodesia.

♂ (M.C.Z. 278974) Chiradzulu Mtn. 30.viii.48.

Except for a slight yellowish wash on the posterior underparts, this bird agrees most nearly with *namwera* Vincent, 1933, but Grant & Praed (1947, Bull. Brit. Orn. Club, **67**, pp. 84–85) consider both *namwera* and *zonarius* synonymous with *bractiatus* which has paragraph preference. Its bill is 22.2 mm.; wing 59.75 mm.

Cinnyris mediocris fülleborni Reichenow

Cinnyris fülleborni Reichenow, 1899, Orn. Monatsb., **7**, p. 7: Kalinga, Iringa District, Tanganyika Territory.

2 ♂♂, 2 ♀♀ (M.C.Z. 278975–8) Lichenya Plateau. 8–11.viii.48.
2 ♂♂ (M.C.Z. 278979–80) Zomba Plateau. 8–10.ix.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 278981–4) Misuku Mtns. 24.ix.–14.x.48.

Native name. *Makilembwe* (Misuku).

Breeding. On August 11, a very large ovum in a Mlanje bird.

Chalcomitra senegalensis gutturalis (Linné)

Certhia gutturalis Linné, 1766, Syst. Nat., ed. 12, **1**, p. 186: "Brazil." South Africa (*fide* Shaw).

♂ (M.C.Z. 278985) Nchenachena. 22.xi.48.
juv. ♂ (M.C.Z. 278986) Chitala River. 10.xii.48.
4 ♂♂ (M.C.Z. 278987–90) near Tete, M. 17–26.i.49.

Sclater (1930, p. 701) remarks that birds of "the Zambesi Valley are intermediates between *gutturalis* and *inaestimata;*" while Vincent (1936, p. 69) refers his Tete birds to *inaestimata*. We follow Grant & Praed (1948, Bull. Brit. Orn. Club, **68**, p. 151) in calling them *gutturalis*.

Native name. *Songosongo* (Nyungwe, for all sunbirds).

Breeding. In November, testes large, but three of the Tete birds are only beginning to assume the black plumage in January.

Cyanomitra olivacea alfredi Vincent

Cyanomitra olivacea alfredi Vincent, 1934, Ibis, p. 90: Namuli Mtn., 4600 feet, Quelimane Province, Mozambique.

♂ (M.C.Z. 278991) Chiradzulu Mtn. 28.viii.48.
♀ (M.C.Z. 278992) Cholo Mountain. 12.iii.49.
♀♀ (M.C.Z. 278993–4) Ruo R., Mlanje Mtn. 1.iv.49.

Anthreptes collaris zambesiana (Shelley)

Anthodiaeta zambesiana Shelley, 1880, Monogr. Nect., p. 343, pl. cxi, fig. 3: "Eastern Africa" etc. Type in Brit. Mus. from Shupanga, Zambezi River, Mozambique.

♂ (M.C.Z. 278995) Chiradzulu Mtn. 30.viii.48.
♂ (M.C.Z. 278996) Mtimbuka. 1.iii.49.

Native name. *Kadiamaluwa* (Yao).

Anthreptes anchietae Bocage

Nectarinia anchietae Bocage, 1878, Jorn. Sci. Lisboa, **6**, p. 208: Caconda, Angola.

♀ (M.C.Z. 278997) Nchenachena. 22.xi.48.

Breeding. Ova numerous and small.

ZOSTEROPIDAE

Zosterops virens stierlingi Reichenow

Zosterops stierlingi Reichenow, 1899, Journ. f. Orn., **47**, p. 418: Iringa, Uhehe, Tanganyika Territory.

♀ (M.C.Z. 278998) Misuku Mtns. 15.x.48.
♂ ♀ (M.C.Z. 278999–9000) Nyika Plateau. 9.xi.48.

These birds have definitely darker backs than the Mlanje birds listed below.

Native name. Nasiru (Misuku).

Breeding. In November, testes large, and ova almost ready for laying.

Zosterops senegalensis ? niassae Reichenow

Zosterops niassae Reichenow, 1904, Journ. f. Orn. **52**, p. 133: Songea, Tanganyika Territory.

2 ♂♂, 2 ♀♀ (M.C.Z. 279001–4) Ruo R., Mlanje Mtn. 8.iv.49.

These birds have lighter backs than those obtained in northern Nyasaland. Benson (1942, p. 325) found *Z. s. anderssoni* nesting at Ncheu.

PLOCEIDAE

Plocepasser mahali pectoralis (Peters)

Philagrus pectoralis Peters, 1868, Journ. f. Orn., **16**, p. 133: Inhambane, Mozambique.

2 ♂♂, 1 ♀ (M.C.Z. 279005–7) near Tete, M. 7–14.i.49.

Native name. Sochina (Nyungwe).

Passer griseus mosambicus van Someren

Passer griseus mosambicus van Someren, 1921, Bull. Brit. Orn. Club, **41**, p. 114: Lumbo, Mozambique.

♂ (M.C.Z. 279009) Mtimbuka. 11.ii.49.
♂ (M.C.Z. 279008) near Tete, M. 14.i.49.

Vincent (1936, p. 75) when assigning birds from Tete and Fort Johnston to *mosambicus*, says that on account of the extensive individual and seasonal variation he has been forced to follow the distribution given by Sclater (1920, p. 724).

Native names. Jolo (Nyungwe); *ngonamakungwa* (Yao).

Ploceus stuhlmanni nyikae Benson

Othyphantes stuhlmanni nyikae Benson, 1938, Bull. Brit. Orn. Club, **58**, p. 112: Nyika Plateau, Nyasaland.

♂ (M.C.Z. 279010) Nyika Plateau. 28.x.48.

Breeding. Testes moderately large.

Ploceus velatus tahatali Smith

Ploceus tahatali A. Smith, 1836, Rep. Exped. Cent. Afr., p. 50: Between Orange River and the Tropic (probably Marico River).

♂ (M.C.Z. 279011) Chitala River. 18.xii.48.
♂ (M.C.Z. 279012) Mtimbuka. 2.iii.49.
♂ (M.C.Z. 279013) near Tete, M. 8.i.49.

Native name. Senja (Nyungwe).

Ploceus intermedius cabanisii (Peters)

Hyphantornis cabanisii Peters, 1868, Journ. f. Orn., **16**, p. 133: Inhambane, Mozambique.

♂♂ (M.C.Z. 279014–5) Mtimbuka, Lake Nyasa. 1.iii.49.
♂♂ (M.C.Z. 279016–7) On N. bank opp. Tete, M. 4.i.49.

Breeding. Tete birds were building in the baobab beside ferry; testes large.

Ploceus ocularius suahelicus Neumann

Ploceus ocularius suahelicus Neumann, 1905, Journ. f. Orn. **53**, p. 339: Lewa, Usambara Mtns., Tanganyika Territory.

♂ (M.C.Z. 279018) Mnema, L. Nyasa. 16.xii.48.
♂ (M.C.Z. 279019) Mtimbuka, L. Nyasa. 1.iii.49.

Native name. Njesi (Yao).

Amblyospiza albifrons albifrons (Vigors)

Pyrrhula albifrons Vigors, 1831, Proc. Zool. Soc. London, p. 92: Algoa Bay, Cape Province.

? ♀ (M.C.Z. 279023) Chiradzulu Mtn. 28.viii.48.

Anaplectes rubriceps (Sundevall)

Ploceus (*Hyphantornis*) *rubriceps* Sundevall, 1850, Oefv. K. Vet.-Akad. Förh., **7**, p. 97: "Caffraria Superiore". Type from Mohrpani Berg, Bechuanaland.

2 ♂♂, 1 ♀ (M.C.Z. 279020–2) near Tete, M. 7–15.i.49.

Native name. Salisuli (Nyungwe).

Euplectes ? orix sundevalli Bonaparte

Euplectes sundevalli Bonaparte, 1850, Consp. Gen. Av., **1**, p. 446: "Caffrer," i.e. Eastern Transvaal.

4 ♀♀ (M.C.Z. 279024–7) near Tete, M. 8–14.i.49.

In the absence of ♂♂, Benson suggests that these birds are most likely referable to *sundevalli*, rather than to "? *nigroventris*" as we had them for they would have constituted an even more southerly record for *nigroventris* than those from Moçuba listed by Vincent (1936, p. 87). On the other hand *E. o. sundevalli* occurs at Tete (cf. Benson, 1949, Bull. Brit. Orn. Club, **69**, p. 112).

Euplectes hordeaceus hordeaceus (Linné)

Loxia hordeacea Linné, 1758, Syst. Nat., ed. 10, **1**, p. 173: "in Indiis," i.e. Senegal (*fide* Gyldenstolpe).

♂ ♂ (M.C.Z. 279028–9) Mtimbuka. 18–22.ii.49.

♂♂ (M.C.Z. 279030–1) Ruo R., Mlanje Mtn. 31.iii.49.

Delacour & Edmond Blanc (1933, Rev. Fr. Orn., N. S., **3**, pp. 539, 549) point out that *sylvatica* Neumann, from Jaunde, Cameroon, with which the senior author identified these skins, is inseparable from *h. hordeaceus* to which Messrs. Chapin and Benson would have us refer them.

Native name. Kanjesa (Yao).

Coliuspasser albonotatus albonotatus (Cassin)

Vidua albonotata Cassin, 1848, Proc. Acad. Nat. Sci. Philadelphia, **4**, p. 65: Port Natal, i.e. Durban, Natal.

♂ (M.C.Z. 279032) Mtimbuka. 18.ii.49.

Native name. Mkanji (Yao).

Breeding. In breeding plumage except that the long tail feathers are not grown.

Coliuspasser hartlaubi psammacromius (Reichenow)

Penthetria psammacromia Reichenow, 1900. Orn. Monatsb., **8**, p. 39: Tandala, Ukinga Mtns., Tanganyika Territory.

4 ♂♂, 6 ♀♀ (M.C.Z. 279033–42) Nyika Plateau. 28.x–17.xi.48.

Breeding. Three ♀♀ noted as breeding, another shot from a flock of thirty ♀♀ which were following one of the handsome ♂♂, all of which are in full breeding plumage with testes enlarged. See Benson (1951, p. 112) regarding the nest and eggs collected 17.xi.48.

Coliuspasser ardens ardens (Boddaert)

Fringilla ardens Boddaert, 1783, Tabl. Pl. enlum, p. 39: Cape of Good Hope, ex. Pl. Enlum. 647.

♂ (M.C.Z. 279043) Cholo Mtn. 23.iii.49.
♂ (M.C.Z. 279044) Ruo R., Mlanje Mtn. 1.iv.49.

Breeding. Full breeding plumage with red collars.

Lonchura cucullatus scutatus Heuglin

Spermestes scutatus Heuglin, 1863, Journ. f. Orn., **11**, p. 18: Dembea, Ethiopia.

♀ (M.C.Z. 279045) Ruo R., Mlanje Mtn. 1.iv.49.

The generic name has been changed from *Spermestes* (as the senior author had it) to *Lonchura* at the suggestion of Dr. Chapin (29.v.52) who is convinced that Delacour (1943, Zoologica, **23**, p. 82) is correct.

Cryptospiza reichenovii australis Shelley

Cryptospiza australis Shelley, 1896, Ibis, p. 184: Shire Highlands; type in Brit. Mus. from Chiradzulu Mtn., Nyasaland.

♀ (M.C.Z. 279046) Chiradzulu Mtn. 27.viii.48.
2 ♂♂, 1 ♀ (M.C.Z. 279047–9) Zomba Plateau. 4–10.ix.48.
♀ (M.C.Z. 279050) Nyika Plateau. 3.xi.48.

Benson (1936, Bull. B.O.C., **56**, p. 100), when clarifying confusing Nyasaland records, gives reasons why *australis* must be regarded as a race of *reichenovii* and not *salvadorii*, and refers *ocularis* Sharpe, 1902, and *r. sanguinolenta* Vincent, 1933, to the synonymy.

Mandingoa nitidula nitidula (Hartlaub)

Estrelda nitidula Hartlaub, in Gurney, 1865, Ibis, p. 269: Natal.

♀ (M.C.Z. 279051) Ruo R., Mlanje Mtn. 8.iv.49.

Lagnosticta rubricata haematocephala Neumann

Lagnosticta rubricata haematocephala Neumann, 1907, Orn. Monatsb., **15**, p. 168: Songea, Tanganyika Territory.

♂ (M.C.Z. 279052) Vipya Plateau. 17.ix.48.

Native names. Nkwehlela (Ngoni); *tunduru* (Timbuka).

Lagnosticta senegala rendalli Hartert

Lagnosticta senegala rendalli Hartert, 1898, Nov. Zool., **5**, p. 72: Upper Shire River, Nyasaland.

♂ (M.C.Z. 279053) Mtimbuka. 19.ii.49.

♂ (M.C.Z. 279054) near Tete, M. 21.i.49.

Mtimbuka is about 14 miles northwest of the Upper Shire, but Benson points out that "Upper Shire" was formerly used as the name of a district of which the headquarters was Liwonde.

Native names. Osisidongo (Nyungwe); *puriti* (Yao).

Estrilda astrild cavendishi Sharpe

Estrilda cavendishi Sharpe, 1900, Ibis, p. 110: Mapicuti, Cheringoma District, Mozambique.

♂ & ? (M.C.Z. 279055–6) Misuku Mtns. 24.ix.48.

The label of one bird has been detached and lost in transit.

Native name. Kaiyaga (Misuku).

Uraeginthus angolensis niassensis Reichenow

Uraeginthus bengalus var. *niassensis* Reichenow, 1911, Mitt. Zool. Mus. Berlin, **5**, p. 228: Songea, Tanganyika Territory.

♂ ♀ (M.C.Z. 279057–8) near Tete, M. 12–14.i.49.

Native name. Sisili (Nyungwe).

Hypochera amauropteryx Sharpe

Hypochera amauropteryx Sharpe, 1890, Cat. Bds. Brit. Mus., **13**, p. 309: Rustenberg, Transvaal.

2 ♂♂, 2 ♀♀ (M.C.Z. 279059–62) near Tete, M. 11–19.i.49.

Native names. Nanchechechc (♂) and *kaujiri* (♀) (Nyungwe).

Hypochera funerea funerea (Tarragon)

Fringilla funerea de Tarragon, 1847, Revue Zool. Paris, p. 189: Natal.

♂ (M.C.Z. 279063) Ruo R., Mlanje Mtn. 2.iv.48.

VIDUA MACROURA (Pallas)

Fringilla macroura Pallas, in Vroeg, 1764, Cat., Adumbr. No. 144, p. 3: "East Indies," i.e. Angola (*fide* Edwards & Brisson).

♂♂ (M.C.Z. 279065–6) Mtimbuka. 28.ii–2.iii.49.
♀ (M.C.Z. 279067) Ruo R., Mlanje Mtn. 1.iv.49.
♂ (M.C.Z. 279064) near Tete, M. 24.i.49.

Native names. *Katsuzuchira* (Nyungwe); *kwichi* (Yao).

Breeding. All in breeding plumage.

STEGANURA PARADISEA PARADISEA (Linné)

Emberiza paradisea Linné, 1758, Syst. Nat., ed. 10, **1**, p. 178: Africa = Angola (restricted).

3 ♂♂ (M.C.Z. 279068–70) near Tete, M. 19–22.i.49.

Native name. *Zuzi* (Nyungwe).

FRINGILLIDAE

SERINUS SULPHURATUS SHELLEYI Neumann

Serinus shelleyi Neumann, 1903, Orn. Monatsb., **11**, p. 184: Kafuro, Bukoba Province, Tanganyika Territory.

♀ (M.C.Z. 279071) Vipya Plateau. 17.ix.48.

Serinus shelleyi is retained on the advice of Messrs. Chapin and Benson who disagree with Grant & Praed (1947, Bull. Brit. Orn. Club, **68**, p. 62) in regarding it as synonymous with the bigger billed *sharpii* Neumann, 1900, of Kilimanjaro and the Kenya Highlands.

SERINUS CANICOLLIS SASSII Neumann

Serinus flavivertex sassii Neumann, 1922, Orn. Monatsb., **30**, p. 13: Tschingogo Forest, Lake Kivu.

♂ (M.C.Z. 279072) Misuku Mtns. 15.x.48.
3 ♂♂, 2 ♀♀ (M.C.Z. 279073–7) Nyika Plateau. 28.x.–13.xi.48.

In regarding this form as a race of *canicollis* we follow Benson (1951, p. 113).

Native name. *Swiswi* (Misuku).

Breeding. October 15–30, testes large; two ♀♀ were sitting. See Benson (1951, p. 113) regarding the three nests and eggs collected.

LINURGUS OLIVACEUS RUNGWENSIS Bangs & Loveridge

Linurgus kilimensis rungwensis Bangs & Loveridge, 1931, Proc. New Eng. Zool. Club, **12**, p. 96: Nkuka Forest, Rungwe Mtn., Tanganyika Territory.

♂ (M.C.Z. 279078) Nyika Plateau. 12.xi.48.

Benson informs us that Grant & Praed no longer regard *kilimensis* as specifically distinct from *olivaceus* Fraser of Fernando Po.

Breeding. Testes large.

EMBERIZIDAE

Emberiza flaviventris flaviventris Stephens

Emberiza flaviventris Stephens, in Shaw, 1815, Gen. Zool., **9**, pt. 2, p. 374: "Cape of Good Hope," etc., i.e. Cape Province (restricted).

♂ (M.C.Z. 279079) near Tete, M. 12.i.49.

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PLATES

PLATE 1

Map Showing Principal Collecting Localities

1948

Landing at Beira, Mozambique (17–19.vii), Loveridge proceeded by rail to Blantyre, Nyasaland (20–26.vii). Thence by truck to Likabula River (26.vii–6.viii) at foot of Mlanje Mtn., which was ascended to Lichenya Plateau (6–23.viii) with side trip to Chambe Plateau (20.viii). Thereafter Chiradzulu Mtn. (25.viii–1.ix); Zomba Plateau (1–13.ix); Dedza (13–14.ix); Kasungu Boma (14–15.ix); Mzimba Rest House (15–16.ix); Macdonald's Camp, Vipya Plateau (16–20.ix); Katumbi (20–21.ix); Chinunkha (21–22.ix); Matipa Forest, Misuku Mtns. (22.ix–18.x); Chinunkha (18–22.x); Chere River Bridge, Northern Rhodesia (22–23.x); Nchenachena (23–25.x); Nyika Plateau (27.x.–19.xi); down to Nchenachena (19–23.xi); Mzimba (23–24.xi); Kasungu (24–25.xi); Nchisi Mtn. (25.xi–13.xii); Chitala River at Empire Cotton Grower's Experimental Station (13–21.xii) with side trips to Mpatanjoka near Salima (15.xii) and Mnema, Makanjila on Lake Nyasa (16.xii); Dedza (21–22.xii); Blantyre (22.xii–3.i.49) with side trips to Hynde Dam, Limbe (27.xii).

1949

Ndirandi Mtn. (1.i). On road to Tete, Mozambique (3–4.i), roadside near Micombo east of Tete (4–5.i); Kasumbadedza Village on south bank of Zambezi 5 miles west of Tete — listed and labeled as "near Tete" (5–31.i); roadside near Mpatamanga Gorge Bridge (31.i.); Blantyre (1.ii); Dally's Hotel, Chipoka, Lake Nyasa (2–3.ii); Mtimbuka as Tembuka on labels (3.ii–7.iii) with side trips to Chowe (12.ii) and Kausi Village, Lake Malombe (25.ii); Blantyre (7–9.iii); Cholo Mtn. (9–28.iii); Magombe Estate, Cholo (28–29.iii); Ruo & Lujeri Rivers, Mlanje Mtn. (29.iii–11.iv); Blantyre (11–20.iv) with side trips to Limbe (16–17.iv) and Shire River at Chikwawa (18.iv). Left Nyasaland by air (20.iv.49).

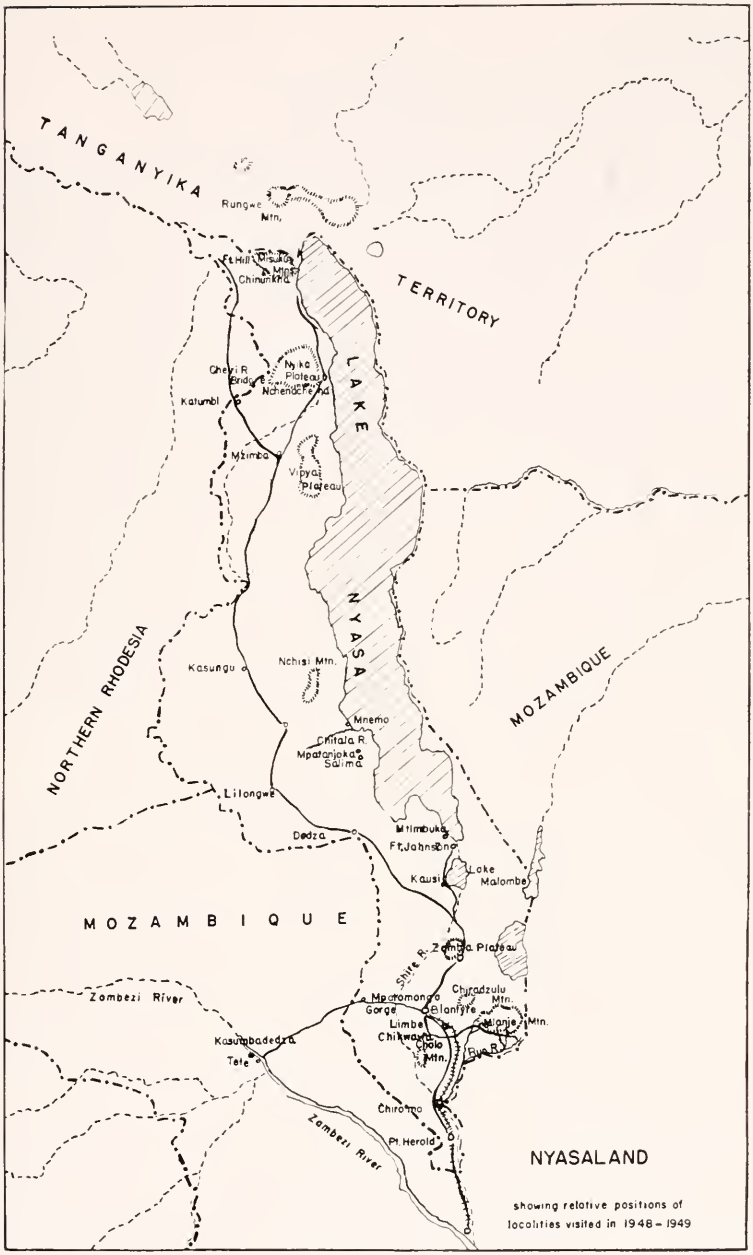
TANGANYIKA
TERRITORY
Rungwe Mtn.
Ft. Hill
Ursula Mtns.
Chinunkha
Chewi R. Bridge
Nyika Plateau
Nchenachena Fd.
Katumbi
Mzimba
Vipya Plateau
LAKE NYASA
NORTHERN RHODESIA
Kasungu
Nchisi Mtn.
Mnemo
Chitala R.
Mpatanjoka
Salima
Lilongwe
Dedza
Mtimbuka
Ft. Johnston
Kasisi
Lake Malombe
MOZAMBIQUE
MOZAMBIQUE
Zomba Plateau
Shire R.
Zambezi River
Mpatamanga Gorge
Chiradzulu Mtn.
Blantyre
Limbe
Chikwawa
Chola Mtn.
Mlanje Mtn.
Fuo R.
Kasumbadedza
Tete
Chiromo
Zambezi River
Pt. Herald
NYASALAND
showing relative positions of localities visited in 1948 – 1949

PLATE 1

PLATE 2

FIG. 1. NEST AND YOUNG OF *Trochocercus a. albonotatus*

As we were about to leave the Nyika Plateau on November 18th, a belated bearer arrived with this compactly built nest of a White-tailed Crested Flycatcher. Constructed of green moss and lichens, it held two young (M.C.Z. 279082–3) which is said to be the normal number. We were familiar enough with the perky little adult flycatchers for there were few evergreen forests where they could not be seen flirting their blackish, white-tipped tails as they flitted about in pursuit of insects.

FIG. 2. NEST AND EGGS OF *Pogonocichla stellata orientalis*

Most nests in the Matipa Forest of the Misuku Mountains were unfavorably situated for photography, but a Usambara White-starred Bush-Robin had selected a site in a sun-dappled clearing in which to construct her nest among drifted leaves carpeting the ground. This beautiful little bird with blue-gray head and throat, gets its name from the silvery spot at the base of the throat where it merges into the golden-yellow of breast and belly. The back and nape are olive green as befits a forest-dweller. Sitting on October 1st.

PLATE 2

1

2

Bulletin of the Museum of Comparative Zoology

AT HARVARD COLLEGE

Vol. 110, No. 3

ZOOLOGICAL RESULTS OF A FIFTH EXPEDITION TO EAST AFRICA

III

REPTILES FROM NYASALAND AND TETE

By Arthur Loveridge

With Five Plates

CAMBRIDGE, MASS., U.S.A.

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INTRODUCTION

The principal collection on which the following report is based, was made by the author while investigating the fauna of the largely deforested mountains of Nyasaland. The enquiry was jointly financed by grants from the Penrose Fund of the American Philosophical Society, and from the Museum of Comparative Zoology on whose behalf it was carried out.

A synopsis of the itinerary is given in the caption accompanying Plate 1 — a map showing the position of the principal collecting localities. Altitudes and other information regarding the various camps will be furnished in the final report of this series which will deal with the general conclusions.

The period of collecting reptiles was from July 17, 1948, to April 20, 1949, during which time 1,120 reptiles, representing 101 species or races, were collected. However, in 1946 (May 27 to October 1) the Vernay-Nyasaland Expedition of the American Museum of Natural History visited the Protectorate in search of mammals, and incidentally gathered 116 reptiles. These Mr. C. M. Bogert of the American Museum kindly submitted to me for identification and incorporation in this report. Of the 37 species collected by the Vernay party I find 5 that I myself failed to encounter in the field.

After elimination of 13 non-Nyasaland species or races that I obtained at Kasumbadedza, on the south bank of the Zambezi five

miles west of Tete, a combination of the two collections reveals that between us we obtained 97 of the 110 species of reptiles now known to occur in Nyasaland. A breakdown of this figure shows it to be composed of 1 species of crocodile, 6 of tortoises and turtles, 51 of lizards, and 52 of snakes.

The last summary of Nyasaland's herpetofauna appeared over fifty years ago when Boulenger (1897e, pp. 800–801) listed 1 crocodile, 14 kinds of lizards, and 22 species of snakes collected by Alexander Whyte, naturalist to the six-year-old Protectorate. Subsequent additions brought the total up to 83; a figure now increased by nearly 33 per cent as a result of the Vernay expedition securing 2 species of lizards, and the Harvard expedition 18 forms of lizards, 6 species of snakes and 1 turtle new to Nyasaland's herpetofauna.

Of these, ten (plus one from near Tete) are here described as new, viz:

Pachydactylus tetensis sp. nov., Kasumbadedza, Tete, Mozambique.
Chamaeleo goetzei nyikae subsp. nov., Nyika Plateau at 7500 feet.
Brookesia nchisiensis sp. nov., Nchisi Mountain at 5000 feet.
Brookesia platyceps carri subsp. nov., Lichenya Plateau at 6000 feet.
Mabuya bocagii mlanjensis subsp. nov., Lichenya Plateau at 6000 feet.
Mabuya hildae sp. nov., Nyika Plateau at 7500 feet.
Mabuya varia nyikae subsp. nov., Nyika Plateau at 7500 feet.
Melanoseps ater misukuensis subsp. nov., Misuku Mountains, 6000 feet.
Platysaurus mitchelli sp. nov., Ruo River, Mlanje Mountain, 3,000 feet.
Platysaurus guttatus nyasae subsp. nov., Blantyre-Tete Road south of Mpatamanga Bridge, Nyasaland.
Lycodonomorphus rufulus mlanjensis subsp. nov., Ruo River, Mlanje Mountain.

In addition to the foregoing new forms, the undermentioned species or races are recorded from Nyasaland or Mozambique for the first time.

New for Nyasaland
Pelusios subniger (Lacépède)
Hemidactylus mercatorius Gray
Chamaeleo dilepis petersii Gray
Mabuya maculilabris comorensis (Peters)
Mabuya maculilabris boulengeri Sternfeld
Mabuya lacertiformis (Peters)
Scelotes arnoldi (Hewitt)
Riopa modesta modesta (Günther)
Melanoseps ater ater (Günther)

Gerrhosaurus major grandis Boulenger
Gerrhosaurus n. nigrolineatus Hallowell
Ichnotropis capensis (A. Smith)
Natriciteres olivacea uluguruensis (Loveridge)
Dasypeltis scaber medici (Bianconi)
Dasypeltis scaber palmarum (Leach)
Crotaphopeltis hotamboeia tornieri (Werner)
Atheris nitschei rungweensis Bogert

In addition to the previously undescribed *Pachydactylus,* the following are additions to the Mozambique fauna.

New for Mozambique
Lygodactylus picturatus picturatus (Peters)
Afroedura transvaalica ? transvaalica (Hewitt)
Mabuya striata ellenbergeri Chabanaud

In view of my having all but 13 of the kinds of reptiles known to occur in Nyasaland, it appeared advisable to extend the scope of this paper so that it might serve as a basis for a herpetology of the country. The actual coverage can best be defined under the various headings employed.

Citations of literature. These are restricted to the original description of each species, together with only such of its synonyms as were described from Nyasaland or Tete. For these the citations are given in full and consequently omitted from the Bibliography on pp.296-301. They are followed chronologically by every reference to Nyasaland material in herpetological literature with the exception of Boulenger's (1915–1920, Proc. Zool. Soc. London) regional keys to African snakes. As many of Boulenger's "species" are composites, their inclusion or omission would require endless qualifications.

As there are numerous additions and some difference in pagination in the faunal lists appearing in the first (1897) and second (1898) editions of Sir Harry Johnston's standard work "British Central Africa," both are cited. The third (1906) edition, however, is omitted as it is merely a reprinting of the second. These lists were evidently based on the material sent home by Sir Harry, who was insufficiently acquainted with nomenclatorial procedure to realize that *Coronella olivacea* and *Tropidonotus olivaceus,* or *Ahaetulla irregularis* and *Chlorophis irregularis,* were but two species assigned to different genera by Günther and Boulenger respectively. I might add that the inclusion of *Ablepharus carsonii* and *Clotho rhinoceros* = *Bitis gabonica* were

based on specimens from Northern Rhodesia, which at that time was part of British Central Africa.

Material. The reptiles resulting from the American Museum of Natural History (A.M.N.H. for short) Vernay Expedition of 1946 are listed first, followed by the specimens I collected in 1948–1949. The latter, catalogued in the Museum of Comparative Zoology (M.C.Z.), are arranged from North to South so that Mozambique material — whether from Beira or Kasumbadedza, five miles west of Tete — always appears last. As the village of Kasumbadedza is not shown on most maps, the material I procured there is listed as from "near Tete, M." and is regarded as topotypic of the 27 species described from Tete, or of the types taken by Livingstone's "Zambesi Expedition" lacking precise locality, for his party stayed at Tete, which is on the Zambezi. Zambezi, the preferred spelling of Webster's Dictionary and the Encyclopaedia Britannica, is employed in preference to Zambesi; similarly Nyasa is used instead of the archaic "Nyassa" of Livingstone.

Records. Under this heading all Nyasaland localities mentioned in the literature prior to 1950 are listed alphabetically, followed by the initial of the first author to identify the particular species from that place. Specimens attributed to the "Shire Highlands" by Günther, usually came from Mlanje or Zomba Mountains and reappear in Boulenger's catalogues with the more precise localization. There is much confusion, however. For example, the reptiles and amphibians listed by Günther, 1894a(1893), in the Proc. Zool. Soc. London, appear in the British Museum catalogue as from Zomba. Yet many of the species, such as *Cycloderma frenatum*, obviously came from Lake Nyasa, having been obtained there during Alexander Whyte's visit to Fort Johnston as indicated by P. L. Sclater in his footnote (p. 618) to Günther's paper. The explanation appears to be that Whyte failed to label his material individually, and on returning to his headquarters at Zomba, he turned over the collections to Sir Harry Johnston to transmit to the British Museum.

Equally unfortunate is Boulenger's (1897e, pp. 800–801) listing of 25 reptiles and 12 amphibians as collected by Whyte on the "Nyika Plateau, 6000–7000 ft." Actually, of these 25 reptiles only 2 ("*Mabuia varia* and *Trimerorhinus tritaeniatus*") or rather subspecies of them, occur on the windswept grasslands of the plateau. The others *may* have been taken on the eastern slopes at Kondowe (Livingstonia Mission) where Whyte stayed, though the more probable habitat for many of them would appear to be the lakeshore directly below the

mission in the neighborhood of 1600 feet. To invite attention to the matter I have entered under the heading *Records* "Nyika Plateau" in quotation marks and omitted the 6000–7000 ft.

Specimens taken by Whyte when on the way from "Kondowe to Karonga," I have cited as "Karonga to Kondowe" so as to conform to the alphabetical arrangement of all place names. When I mentioned another of Whyte's localities to Mr. C. W. Benson, whose intensive studies of the Nyasaland avifauna are well-known, he advised me to accept Whyte's type localities with caution as those of several of his birds and mammals were unquestionably incorrect.

In Whyte's time, I imagine, the differences between the herpetofauna of Zomba (township) and Zomba Plateau were more pronounced than is the case today. Yet "Zomba" was apparently used rather loosely for both. While it is customary for Nyasaland residents to refer to Zomba Plateau or Zomba Mountain, one never hears mention of Nyika Mountain, though some such definition is needed for the faunistically distinct slopes below the 7000–foot plateau.

In the case of other mountains everyone seems to speak of Mt. Chiradzulu, or Mt. Cholo. For the sake of uniformity I prefer to cite them as Chiradzulu Mtn. or Cholo Mtn. so as to conform to the usual treatment of other ranges like Mlanje or the Misuku Mountains.

The letter in parentheses following each record is an identifying initial for the author from whose published writings it has been taken. In the case of Bogert, Gray and Nieden the name is given in full, otherwise:

B = Boulenger	H = Hewitt	M = Mitchell
D = Duff	J = Johnston	P = W. Peters
G = Günther	L = Loveridge	S = Sternfeld

Also included are localities taken from a manuscript list of live material captured by Mr. B. L. Mitchell (M. ms.), to whom I am indebted for this privilege. Only those records were used where there seemed little doubt as to the identification. Questionable determinations are omitted as it is unlikely that the actual specimens have been preserved for study purposes.

Native names. So far as was possible I have recorded the names applied to specific reptiles only by the tribesmen in whose territories they were found. As these names had to be discussed through the medium of Swahili or an interpreter, I make no claim that the outcome is wholly satisfactory though every effort was made to get them

correct. The results can be compared with the names furnished by Mitchell (1946, pp. 41–42), the only person in Nyasaland, so far as I am aware, who has made any serious attempt to collect reptilian names in the vernacular. In a few instances our answers conflict, but not to the extent my Nyungwe names differ from those published by Wilhelm Peters (1882a) after his stay at Tete during the years 1844–5.

The English names often inserted under this heading, have had their group names hyphenated for the sake of uniformity, e.g. Mlanje Flat-Lizard, Rhombic Egg-eater, Cape Vine-Snake, to avoid misapprehensions that it is a lizard of the Mlanje Flats, a snake of the Cape Vines, etc. These names are included in the hope that they may become standardized in the Protectorate and render this contribution to its herpetology useful to a wider circle of Nyasalanders than would otherwise be the case.

Breeding. On this subject a mass of information will be found about which I hesitate to generalize in view of the difference in seasons existing between north and south Nyasaland, to say nothing of the altitudinal factors that should be taken into consideration. The data requires digesting by a resident naturalist with year-round experience of local factors in more normal seasons than those of 1948–9.

Other information will be found under the headings of Sexual dimorphism, Diet, Parasites, Enemies, Temperament, Aestivation and Hibernation, Habits, Habitat, and Folklore.

ACKNOWLEDGEMENTS

The opportunity is taken of thanking Dr. A. S. Romer, Director of the Museum of Comparative Zoology, for his friendly support of these investigations, and the Trustees of the Penrose Fund of the American Philosophical Society for a substantial grant towards the expenses of the expedition. The Administration of Nyasaland without whose assistance the execution of my plans would have been well-nigh impossible in a year of almost unprecedented drought and gasoline shortages. Also thanks are due to Mr. B. L. Mitchell of the Fish and Tsetse Department for furnishing me with local information regarding the reptiles in which he is so much interested.

Of the reptiles mentioned in this paper, the types of 42, exclusive of any described by Sir A. Smith, are in the British Museum together with the material on which most of the earlier records are based. Some of these I was able to examine when passing through London,

but since my return Dr. H. W. Parker and Mr. C. J. Battersby have patiently answered innumerable questions that have arisen in the course of this work. I am especially grateful to them for their willingness to take the time necessary to settle the points raised.

I would also express my thanks to Mr. C. M. Bogert for allowing me to include the material collected by the Vernay-Nyasaland Expedition for the American Museum of Natural History, and supplying information regarding it. Mons. Jean Guibé (Museé d'Histoire naturelle) and Dr. A. A. Themido (University of Coimbra) also answered questions regarding specimens in their care, as did B. R. Fuller, Esq., Assistant Conservator of Forests, respecting the absence of palms on Nchisi Mountain.

The profitless task of identifying the insects present in lacertilian stomachs has been performed by my entomological colleagues — Drs. J. C. Bequaert, W. L. Brown, P. J. Darlington and F. Werner, to all of whom I am truly grateful. I also wish to thank Mr. J. T. Lucker for determining the nematode parasites, Prof. M. C. Meyer for doing the leaches, and Mr. Russell Olsen for settling nomenclatorial questions involving a knowledge of the classics.

For most of the photographs illustrating this paper I am indebted to my wife and her sister, Miss Hilda Sloan; to Mr. J. A. Lennon of Port Elizabeth go my thanks for the snapshot of a bird-eating chameleon; to Dr. P. E. Vanzolini for kindly photographing the new gecko; and to the Zoological Society of London for permission to use the text figures accompanying the synoptic key for identifying Nyasaland snakes.

SUMMARY OF TAXONOMIC ALTERATIONS

Trinomials, which were not employed by Boulenger for designating geographical populations, are required for no less than 75 of the 118 forms listed in this paper. Corrected misidentifications from the earlier literature will be found in the citations but are far too numerous to list here. Apart from such corrections, little real synonymizing has been necessary; only the undermentioned being considered new synonyms.

Crocodylus niloticus pauciscutatus Deraniyagala	= ? *Crocodylus niloticus* Laurenti
Hemidactylus gardineri Boulenger	= *Hemidactylus mercatorius* Gray

Lacerta cameranoi Bedriaga is adult of *Nucras intertexta ornata* (Gray)

Latastia bredoi de Witte = *Latastia johnstoni* Boulenger
Ichnotropis longipes Boulenger = *Ichnotropis capensis* (Smith)
Ichnotropis overlaeti de Witte & Laurent = *Ichnotropis capensis* (Smith)
Glypholycus whytii Boulenger now *Lycodonomorphus rufulus whytii* (Blgr.)
Tarbophis barnumbrowni Bogert = *Crotaphopeltis h. hotamboeia* (Laurenti)
Aparallactus ulugurensis Barbour & Loveridge is adult of *A. guentheri* Boulenger, which was based on a faded juvenile.

The undermentioned races which I have hitherto regarded as synonyms are revived.

Holaspis guentheri laevis Werner is revived for the East African race.
Psammophylax tritaeniatus variabilis Günther is revived for the dark-bellied montane form found south of the equator, previously miscalled *t. tritaeniatus* which is a white-bellied, brightly colored, lowland race.
Thelotornis kirtlandii oatesii Günther is revived for certain lowland vine-snakes of Nyasaland, Southern Rhodesia, and probably Angola.
Aparallactus guentheri Boulenger is revived from the synonymy of *A. capensis* Smith, from which it is distinguished chiefly by color and size.

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* An asterisk is employed to denote non-Nyasaland species that were collected near Tete on the south bank of the Zambezi, Mozambique.

SYSTEMATIC DISCUSSION

CROCODYLIDAE

Crocodylus niloticus Laurenti

Crocodylus niloticus Laurenti (part), 1768, Syn. Rept., p. 53: "India orientali, et Aegypto."

Crocodilus niloticus Boulenger, 1897e, p. 800; Johnston, 1897, pp. 355, 361; 1898, pp. 355, 361; pl. xxiv; Duff, 1906, p. 132; Mitchell, 1946, pp. 16, 40.

2 skulls (M.C.Z. 50301–2) Chipoka. 3.ii.49.
Eggshell (M.C.Z. 50303) near Mtimbuka. 17.ii.49.

Records. Chikwawa (J); Chiromo (M); Chiuta Lake (M); Nkata Bay (D); also the following records from Mitchell ms.: Fort Johnston; Monkey Bay; Port Herald.

Native name. Ngwena (Yao).

Variation. It may be wondered why trinomials are not employed in view of Deraniyagala's (1948, p. 31) action in separating Lake Rudolf crocodiles under the name of *C. n. pauciscutatus*. This he did principally on the basis of the number of transverse rows of dorsal scutes averaging slightly less for the six Rudolf specimens available to him, one of which had 15, four 16, and one 17 transverse rows.

Through the courtesy of Mr. Robert F. Inger I am able to furnish the counts of nine *niloticus* (from Senegal; French Sudan; Anglo-Egyptian Sudan and Bechuanaland) in the collection of the Chicago Natural History Museum. One has 15, four 16, and four 17 transverse rows.

Unfortunately there is no Rudolf material in the Museum of Comparative Zoology, but of fourteen *niloticus* from other parts of Africa and Madagascar, two have 16, one is doubtful, and eleven have 17 transverse rows. If the intermediate specimen be omitted and these figures added to the thirteen *niloticus* seen by Deraniyagala and the nine counted by Inger, we have the following figures for the typical form: two with 15, six with 16, and twenty-seven with 17 transverse rows.

It might be added that the specimens in the Museum of Comparative Zoology with 16 rows are from Mahabo, Madagascar (M.C.Z. 16731, an adult), and the Tsavo River, Kenya Colony (M.C.Z. 7991), the latter being one of two hatchlings, the second possessing 17 rows.

The other character cited by Deraniyagala as distinguishing *pauciscutatus*, viz. "median row of ventral scutes enlarged," is too variable a one to be utilized on account of the occurrence of many

intermediate conditions. The median ventral scutes are very conspicuously enlarged in two Malagasy crocodiles (M.C.Z. 16731, 16868), but not so in others from the same island.

From the small sample of Rudolf crocodiles available it certainly appears as if they exhibit some slight average difference in the number of transverse rows of dorsal scutes, but insufficient to justify recognition until adequate sampling from all parts of Lake Rudolf shows we are dealing with a really representative series of the population which can be distinguished in conformity with Dunn's law.

In the same paper Deraniyagala (1948, p. 30) casually mentions the eight-foot crocodiles of Lake Baringo, suggesting that they might be called *C. n. worthingtoni* should they prove to be distinct. I merely mention it here as the name is apt to be overlooked owing to the unfortunate manner of its proposal in the text. Dwarfed crocodiles in restricted bodies of water have been reported to me from points as far apart as Karamoja in Uganda east to Ethiopia and south to Swaziland.

Size. Of the skulls listed above, viz. M.C.Z. 50301 and 50302.

Length from snout to rear of quadratojugals	535 mm.	520 mm.
Length from snout to rear of squamosals	503 mm.	478 mm.
Width of skull across the quadratojugals	305 mm.	250 mm.

In other words the overall lengths of these crania were 21⅛ and 20½ inches, yet their greatest widths were 12″ and 9⅞″ respectively. This disproportion, alleged to be sexual, was reflected in the bodies, one being robust and thick-set, the other slender, though their lengths appeared much the same. The crocodile with the larger skull was measured by Mr. C. C. Yiannakis, who told me it was 13 feet, 10 inches. Assuming this to be correct the reptile was slightly more than seven times the length of its cranium, the proportions found by K. P. Schmidt for other species.

Breeding. Hearing that crocodiles nested on an isolated sandy beach just north of Wright's place, three or four miles up the coast from Mtimbuka, I rowed there. On landing I found two nests from which young had hatched out fairly recently. Eggshells were strewn around and trails of both young and old crocodiles were plentiful. The dune-like site was overgrown with scrub, interspersed with swamps, and one largish, though shallow,lagoon in which could clearly be seen a number of crater-like excavations. These, said my native guide, who was the local Fisheries Department headman, had been made by crocodiles

for the benefit of their young. Never before having heard of such a practice I cannot say whether it is correct.

Diet. Fish form the principal food of these Lake Nyasa crocodiles, to whom fish offal is a great attraction. Employing some as bait, on the night of my arrival at Chipoka, Mr. C. C. Yiannakis snared, then shot, a crocodile on the beach less than a hundred yards from his house. Next morning I called on Mr. Yiannakis who said I might have the head after removal of the hide; he took me to see the reptile which his boys declared was a female. The alleged male was taken in the same snare the next night.

The following evening, with both corpses in tow, Yiannakis took me in his motor launch two miles down the lake to a reed-grown, sandy bay. This, said Yiannakis, was headquarters on this part of the lake for crocodiles, which could be depended on to devour their defunct companions. The two we had brought them must have weighed about 400 pounds each, so dragging the carcasses up the slightly sloping sandbank was an arduous undertaking for the five Africans accompanying us. After the heads had been chopped off with an axe for me, the corpses were cut in sections that could be dragged far into the reeds, so far that their companions would not be tempted to drag them back into the lake. Only when personally satisfied that this had been done, would Yiannakis consent to leave them.

It was dark long before we beached at Chipoko and the already stinking trophies could be transferred to the back of our truck for the drive to the house I was occupying on the shore at Mtimbuka.

Early next morning I had the heads carried down to the shore and buried in a deep hole about ten feet from the water's edge and a hundred feet from the house. Fairly heavy branches were piled on top of the foot of sand that covered the uppermost head. Nevertheless, that night a crocodile left the lake exactly opposite the burial place, walked to it and scraped away the covering sand till it had exposed a bit of one head. The next night two crocodiles came, pushed aside the branches and dug out one of the heads, now seething with maggots, but did not eat it. On discovering what had happened I had the heads reburied deeper and a cairn built over them. Three weeks later we dug up the two skulls, both beautifully white and clean.

From the next beach to this one a crocodile had taken a young boy one afternoon last year, I was told, but Yiannakis, who has been conducting extensive fishing operations on the lake since 1934, tells me he has not lost any men since 1936 when two were taken by crocodiles.

On the second occasion, attracted by the shouts of his men, Yiannakis and his cousin took the launch and went out to the boats engaged in fishing. The cousin caught sight of the crocodile and fired, the first bullet cutting through the fingers of both reptile and man; the second shot hit the crocodile in the head and killed the monster; on being taped it was found to measure 18 feet, 10 inches. Unfortunately, having no means of preserving so large a specimen, they threw it back into the lake. The victim was dead but he was the last of Yiannakis' men to be so killed, though crocodiles sometimes swarm about the nets when fishing operations are being conducted at night.

At Kasumbadedza, on the south bank of the Zambezi, I was summoned by two small goatherds to shoot a crocodile that had seized one of their charges. The goat was a large one and had struggled free before I reached the spot, though just opposite my tent. The goat, a white one, could be seen bobbing along in the brown current a quarter-mile down stream. Even as we looked it became the center of a violent contest between several crocodiles, one of whom, rearing upright in the water, exposed fully five feet of throat, breast and belly gleaming white in the afternoon sunshine. One of the herds drew my attention to the snouts and crowns of two crocodiles floating off-shore below us, declaring the larger was the reptile that had dragged his goat into the river. I missed one but got the second in the head; churning the water, it sank.

A few days later I was called to shoot a female kudu that had been driven into the river by a huntsman's curs. The animal, big as a pony, had evidently relinquished its attempt to swim the river and was now battling the current fifty feet off shore. Presently it turned and reached shallow water where it stood facing the wildly excited pack of yelping dogs, while behind it rose several crocodile snouts as three sinister pairs of eyes surveyed the scene.

Folklore. A 'charm', consisting of two crocodile teeth securely sewn together in a scrap of khaki so as to form a crescent from which the points alone projected, was brought back for the Peabody Museum. This seemingly harmless ornament would — after appropriate spells had been employed — allegedly lure an intended victim to the water-side where a crocodile was lying in wait to seize him! It had been purchased from a Chikunda sorcerer near Port Herald by an African. In 1911 this man was arrested for stealing growing maize. During the ensuing trial the accused said he stole the maize because the sorcerer had sold him 'medicine' that was to render him invisible. Unfortunately

for the would-be thief his faith was unequal to the occasion when he saw a policeman passing by the plot he was engaged in robbing. The native took to his heels and by doing so aroused in the askari a reaction similar to that produced in a cat by a speeding mouse. The askari gave chase and captured the thief in whose possession the crocodile 'charm' was found. After the trial it passed into the possession of the then medical officer, Dr. J. O. Shircore, to whom I am indebted for these particulars as well as the specimen.

TESTUDINIDAE

Testudo pardalis babcocki Loveridge

Testudo pardalis Johnston (not of Bell), 1897, p. 361; 1898, p. 361; Mitchell, 1946, p. 20.

Testudo pardalis babcocki Loveridge, 1935, Bull. Mus. Comp. Zool., **79**, p. 4: Mount Debasien, Karamojo, Uganda.

3 ♂♂, 3 ♀♀ (M.C.Z. 50304–9) near Tete, M. 8–19.i.49.

Records. Tengani, Port Herald (M). Mitchell is the first to furnish an authentic record of its occurrence in Nyasaland, for Johnston merely lists it as a possibility in parentheses along with five other members of the family which certainly do *not* occur within the Protectorate. One (*T. calcarata* = *sulcata*) being confined to Abyssinia, while the other four (*T. angulata, T. geometrica, H. areolatus,* and *H. femoralis*) are known only from south of the Zambezi.

Native name of the Eastern Leopard-Tortoise. *Kamba* (Nyungwe).

Size. Largest ♂ (M.C.Z. 50307) 218 mm. in carapace length; largest ♀ (M.C.Z. 50309) 297 mm. Range of series 60–297 mm., the height being included in the length from 1.81 (youngest) to 2.07 (adult) times; therefore within the limits of this deep-shelled race.

Habitat. As these leopard tortoises were brought alive to my camp at Kasumbadedza Village (*circa* 250 feet), the alternative name of "mountain tortoise" is hardly merited for they were almost certainly found in the vicinity or in the low hills a few miles south of the Zambezi plains.

Kinixys belliana belliana Gray

Kinixys Belliana Gray, 1831, Syn. Rept., p. 69: No locality.

Cinixys belliana Johnston, 1897 and 1898, pp. 356, 361; Duerden, 1907a, p. 9.

Kinixys belliana zombensis Hewitt, 1931, Ann. Natal Mus., **6**, p. 469, fig. 1c,

pl. xxxviii, fig. 17: Zomba, Nyasaland (founded on a ♀; it will be noted that fig. nos. on plate do not correspond with text in this and next form); Mertens, 1934a, p. 63.

Kinixys youngi Hewitt, 1931, Ann. Natal Mus., **6**, p. 486, fig. 1d, pl. xxxvii, figs. 10–11: Lake shore near Livingstonia, Nyasaland (founded on two ♀♀, also a ♂ taken 120 miles from Livingstonia). Mertens, 1934a, p. 8.

Kinixys zombensis Mitchell, 1946, p. 19.

♀ (A.M.N.H. 67849) Chibotela. viii–ix.46.
10 ♂♂, 10 ♀♀, 2 yng. (M.C.Z. 50311–32) Mtimbuka. 7–26.ii.49.
♀ (M.C.Z. 50310) Mpimbi, Zomba. iv.49.
yng. (M.C.Z. 50333) Cholo Mtn. 18.iii.49.

Records. Below Livingstonia (H); Ngoniland (H): Zomba (H). Also the following records from Mitchell ms.: Chikwawa; Chiromo; Chitala River; Fort Johnston; Likangala; Monkey Bay; Port Herald; Zomba.

Native name of Eastern Hinged Tortoise. *Ngongo* (Yao).

Variation. Hewitt's names were based on individual variations and do not represent recognizable races unless it can be demonstrated, as I (1936j, p. 218) once supposed, that a low-shelled form occurs in arid, rocky areas. In that event an earlier name (*Kinixys belliana spekii* Gray, 1862: Tanganyika Territory), of which *youngii* is a synonym, is available. The Mtimbuka series certainly represent this shallow form.

Mr. Mitchell kindly gave me the Mpimbi tortoise, which represents the high-vaulted type, but the Cholo juvenile which might be expected to agree with typical *belliana* in proportions is actually more extreme than any Mtimbuka specimens, including those of approximately the same length, as will be seen from the following data.

It was for reasons of this nature, based on Kenya-Tanganyika material, that I (1942e, p. 247) reluctantly synonymized *spekii*. However, it need not be assumed that the matter is settled, but it is to be hoped that subspecific names will not be employed unless supported by adequate material that demonstrates beyond question that the separation really has geographical significance. Trinomials are used because west of Togoland *K. b. nogueyi* Lataste has only four claws on each front foot.

Size. Except in occasional specimens where the gulars of the plastron project beyond the carapace, "shell length" corresponds with carapace length.

	Length	Height	Breadth
largest ♂ (M.C.Z. 50314)	190 mm.	80 mm.	122 mm.
largest ♀ (M.C.Z. 50321)	207 "	88 mm.	135 "
Mpimbi ♀ (M.C.Z. 50310)	193 "	90 "	131 "
Mtim. juv. (M.C.Z. 50331)	72 "	32 "	62 "
Cholo juv. (M.C.Z. 50333)	72 "	32 "	59 "
smallest (M.C.Z. 50332)	64 "	28 "	55 "

Thus height of the Mpimbi ♀ is included in its length 2.14 times, that of ten Mtimbuka ♀♀ .....from 2.26 to 2.58 times, that of ten Mtimbuka ♂♂ .....from 2.25 to 2.48 times, that of two Mtimbuka and one Cholo young from 2.25 to 2.28 times.

TRIONYCHIDAE

Cycloderma frenatum Peters

Cycloderma frenatum Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 216: Zambezi River, Mozambique. Günther, 1894a (1893), p. 618; Johnston, 1897 and 1898, pp. 256, 361; Tornier, 1900b, p. 583; Mitchell, 1946, pp. 21, 41.

3 eggs (M.C.Z. 50344) Mtimbuka. 7.ii.49.
20 juv. (M.C.Z. 50345–56) Mtimbuka. 7–28.ii.49.
3 ♀♀ (M.C.Z. 50357–9) Mtimbuka. 10–28.ii.49.
juv. (M.C.Z. 50360) Chowe. 12.ii.49.

Records. Fort Johnston (G); ? Lake Chilwa (M); Lake Nyasa (Tornier's records are really extralimital as they refer to the northeast shore, chiefly Manda, former Wiedhaven); Monkey Bay (M. ms.); Shire River (M).

Native names. Nkhasi (Yao, but also applied to *Pelusios*); *litetamera* was what the Yao on the Ruvuma River (Loveridge, 1942e, p. 251) called this Zambezi Mud Turtle, a more appropriate name than "Soft-shelled Turtle" for a species with so well-developed a bony carapace.

Color. The heads of hatchlings all exhibit characteristic markings which, above, consist of a light-edged dark interorbital crossbar, and five similar, but wavy and sometimes broken, longitudinal lines from near occiput to base of the long neck; below, the throat and neck may be pure white or show some dusky streaks. The skin covering the carapace varies from pale gray to leaden, with usually a white edge around the periphery; the plastron may be almost white, but more usually has an irregular black blotch about the umbilicus, an elongate

oblique one near each forelimb, a rounder one anterior to each hind limb, and a smaller sixth spot in the anal region.

Size. Overall shell length of the three adult ♀♀ was, in life, substantially the same, viz. length 560 mm., breadth 418 mm., but with shrinkage of the leathery integument they are now approximately 435 and 360 mm. The head and neck of M.C.Z. 50357 measured 420 mm., while breadth of head was 100 mm. Overall shell lengths of the young range from 40–48 mm., their breadth 30–36 mm.

Breeding. On February 7th natives brought in three clutches of eggs numbering 15, 16, and 19 respectively, but whether complete sets I cannot say. The three adults, undoubtedly captured when coming ashore to lay on the 10th, 19th, and 28th, all held spherical, hard-shelled eggs ranging from 33 to 35 mm. in diameter. One ♀ laid 3 eggs before being killed, 19 more were present in her oviducts, and many shell-less ova of various sizes were present in the ovaries.

On February 7th, the fourth day after a heavy downpour that terminated about eight months drought (but did not inaugurate the rains as was hoped), a young turtle with carapace caked in mud was found. On many others the umbilical suture was still unhealed.

Diet. Mitchell (1946, p. 21) states that these turtles subsist principally on aquatic snails and mussels. At Mtimbuka I found the former were *Lanistes ellipticus* and *L. sordidus*, though we collected two other species elsewhere in the lake. The clams proved to be *Mutela alata* and *simpsoni*, with a robust cockle-like shell (*Caelatura nyassensis*) especially abundant.

Later Mitchell (3.ii.47), who has added more to our knowledge of this turtle's habits than anyone, wrote me that two young *frenatum* in a tank in his garden came readily to feed on strips of fish and raw meat which they would take from his fingers.

Parasites. Two leaches of the family Glossiphonidae, possibly *Placobdella jaegerskioeldi*, removed from the base of the neck of M.C.Z. 50357, were so poorly preserved that Prof. M. C. Meyer considers a more definite assignment inadvisable.

Enemies. On the village middens around Mtimbuka I saw (11.ii.49) scores of eggshells. My Yao headman, whose home is only a few hours north of Mtimbuka, accepted turtle eggs gladly; the rest of my sophisticated staff scorned the idea of eating them. I ate 18, having them scrambled six at a time for breakfast, and though not nearly as nice as fowl eggs they were quite edible.

Temperament. All three females were timid, shy, and inoffensive, so that when Johnston (1897, p. 356) says that *Cycloderma* turtles "are very fierce," he is apparently attributing to them the reputation of the American soft-shelled turtles of the genus *Amyda* (now separated from the oriental *Trionyx*).

Habits. During the month of January, which I spent in camp on the Zambezi near Tete (true type locality for *frenatum*), I made every effort to secure topotypic material but without success. Native fishermen and others asserted that these mud turtles would not be seen until the rains, already two months overdue, broke.

PELOMEDUSIDAE

Pelomedusa subrufa subrufa (Lacépède)

La Roussatre Lacépède, 1788, Hist. nat. Quadrup. ovip. Serpens, **1**, p. 173, pl. xii: "de l'Inde," as Sonnerat coll., restr. to Cape.

Testudo subrufa Lacépède, 1789, Hist. nat. Quadrup. ovip. Serpens, **2**, Synopsis methodica (a table in which binomials are employed).

Pelomedusa galeata Hewitt, 1935, p. 325.

Pelomedusa subrufa subrufa Loveridge, 1941d, p. 470.

♀ (M.C.Z. 50334) Lirangwe near Blantyre. 1949.

Records. Mr. B. L. Mitchell, to whom I am indebted for this Southern Marsh-Terrapin, informs me he has taken the species also at Chitala River and Chiromo. The only record in the literature is of a Livingstonia specimen collected by W. P. Young (H).

Variation. Hewitt suggests the Livingstonia terrapin represents a "distinct form." This appears unlikely, however, as at the time I (1941d, p. 470) revised the family no valid grounds could be found for recognizing any of the four South African races proposed by him. As is usual in the typical form, the pectoral shields are broadly in contact.

Size. Carapace length 149 mm.; breadth 118 mm.; height 52 mm.

Pelusios subniger (Lacépède)

La Noiratre Lacépède, 1788, Hist. nat. Quadrup. ovip. Serpens, **1**, p. 175, pl. xiii: No type locality.

Testudo subnigra Lacépède, 1789, Hist. nat. Quadrup. ovip. Serpens, **2**, Synopsis methodica (a table in which binomials are employed).

juv. (A.M.N.H. 67850) Chibotela. 24.viii–8.ix.46.
juv. (M.C.Z. 51100) Shire River at Port Herald. 1949.

Records. The juvenile side-necked water-tortoise from the Shire River near Murchison Rapids compared with *subniger* by Gray (1863c, p. 405) appears to have been a young *sinuatus*, judging by the description furnished by Gray. The specimen is not in the British Museum and Dr. H. W. Parker suggests that it may have been presented to the zoological gardens alive.

The side-necked water-tortoise referred to as the "Lower Shire Pelusius" (*sic*) by Mitchell (1946, p. 20) is presumably this Black Water Tortoise, probably also Mitchell's "Chilwa Pelusius" with a carapace length of nine inches, for this is the usual maximum for *subniger* in East Africa, though examples of eleven inches have been reported from the Congo. Mitchell concurs that the unidentified water tortoises taken by him at Chiromo, Chikwawa and Port Herald are also referable to this species.

Since writing the foregoing I have heard from Mr. Mitchell, who says (14.i.50): "Mr. John Handeman recently showed me two turtles from the Lower Shire, the first I have seen from there since you sent me a copy of your Revision of the Pelomedusidae. They are undoubtedly *P. subniger*, quite large specimens." Mr. J. Handeman is the collector of M.C.Z. 51100 listed above.

Color. The plastrons are yellowish with a rusty red blotch towards the posterior outer edge of each shield.

Size. Total length of larger (A.M.N.H. 67850), 100 mm.; width 78 mm.; height 43 mm.

Pelusios sinuatus (Smith)

Sternothaerus sinuatus A. Smith, 1838, Ill. Zool. S. Africa, Rept., pl. i: In rivers to the north of 25° S., South Africa. Günther, 1894a (1893), p. 618; Johnston, 1897 and 1898, p. 361.
Sternothaerus ? subniger Gray, 1863c, p. 405; 1870, p. 80.
Sternothaerus nigricans Strauch, 1865, p. 108.
Pelusios sinuatus Loveridge, 1941d, p. 502.

9 (M.C.Z. 50335–43) Mtimbuka. 7–26.ii.49.

Records. Shire River at Fort Johnston (G). Shire River near Murchison Rapids (Gray). Also taken at Fort Johnston and Monkey Bay by Mitchell.

Native name. *Nkhasi* (Yao, but applied to *Cyeloderma* also).

Variation. In this good age-series, with carapace lengths ranging from 41–300 mm., the suture between the abdominals is less than the length of the anterior lobe of the plastron in the smallest (41–90 mm.), equal to it in the medium-sized (100–189 mm.), and considerably longer in the two largest (278–300 mm.) which are both females. The vertebral shields are very variable in shape, those of the 278 mm. female being parallel-sided as in the figured type of the 274 mm. *P. s. leptus* Hewitt (1933a, p. 45, pl. ix, fig. 2), an unrecognizable form described from Isoka, Northern Rhodesia.

Color. All display the characteristic angular pattern on the periphery of the yellow (grayish in three under 44 mm.) plastron which distinguishes the Serrated Terrapin from all other species.

Size. Carapace length of ♂ (M.C.Z. 50337) 289 mm.; height 110 mm.; breadth 201 mm. For the entire series the height is included in the length from 2.5 (adult) to 3.7 (youngest) times, and the width in the height from 1.1 (youngest) to 1.3 (adult ♀ ♀) or 1.4 (adult ♂) times.

Breeding. Three young were recent hatchlings.

GEKKONIDAE

Hemidactylus mabouia (Jonnés)

Gecko Mabouia Moreau de Jonnés, 1818. Bull. Soc. Philom. Paris, p. 138: Antilles and adjacent mainland.

Hemidactylus mabuia Boulenger, 1885d, p. 123; 1891a, p. 306; 1897e, p. 800; Johnston, 1898, p. 361.

Hemidactylus mabouia Günther, 1894a (1893), p. 618; Johnston, 1897, p. 361; Mitchell, 1946, p. 22; Loveridge, 1947a, pp. 167–180.

♂ (A.M.N.H. 67814) Chibotela. viii–ix.46.
♂ (M.C.Z. 50361) Misuku Mtns. 27.ix.48.
♂ (M.C.Z. 50362) Nchisi Mtn. 3.xii.48.
3 ♂♂, 3 ♀ ♀ (M.C.Z. 50363–7) Chitala R. 14.xii.48.
♂ (M.C.Z. 50368) Dedza. 13.ix.48.
4 ♂♂, 2 ♀ ♀ (M.C.Z. 50369–70) Mtimbuka. 7–9.ii.49.
♂ (M.C.Z. 50371) Chowe. 12.ii.49.
♂ (M.C.Z. 50372) Chiradzulu Mtn. 29.viii.49.
♂ ♀ (M.C.Z. 50373–4) Cholo Mtn. 16.iii.49.

Records. Fort Johnston (G); Karonga to Kondowe (B); "Nyika Plateau" (B); Port Herald (M); Shire Valley (B); Zomba (L). Also occurs at Likabula River according to Mitchell, and seen by me on walls of Chire River Bridge rest house, Northern Rhodesia.

Native names of the House Gecko. *Kipakapaka* (Misuku); *dudu* (Chewa; Ngoni); *jusi* (Yao, fairly specific, strangely enough, as *mjusi* is Swahili for all lizards).

Variation. Upper labials 9–13; lower labials 7–11; preano-femoral pores in males 28–52; scansor rows under first toe 5–7, under fourth 7–11. These last figures are an extension of the former range 7–9, and it is to be noted that it applies solely to the eight lake littoral (Chibotela; Chowe; Mtimbuka) geckos which range from 9–11[1], but otherwise do not differ from the rest of the material. Dorsal tubercles may be conical or keeled as in the West Indies (cf. Loveridge, 1947a, p. 172).

Size. Largest ♂ (M.C.Z. 50363), 177+ (90 + 87+) mm.; largest ♀ (M.C.Z. 50364), 185 (88 + 97) mm.; smallest from snout to anus 53 mm., all three from Chitala River.

Breeding. Eggs are always laid in pairs and I am sure Mitchell (1946, p. 22) is mistaken in thinking a gecko can produce three.

Habits. These geckos were especially plentiful in the house I occupied at Mtimbuka, where one gecko in particular used to haunt the windowpane in front of my table when the lamp was lit. It amused me by incessantly twitching and waving its tail as it watched some insect. Failure to seize potential prey after a stalk almost invariably served as a stimulus for tail-waving. Nightly I heard, or was awakened by, tapping on the glazed doors or windows of my bedroom; a noise that might well startle a sleeper unacquainted with the habits of these lizards. Fortunately, I at once guessed that the rapping was caused by a gecko hammering some recalcitrant prey that objected to being swallowed.

Habitat. Taken on rocks at Chowe, in houses at Chiradzulu, Chitala, Dedza, Mtimbuka and Nchisi, at altitudes ranging from 1500 to 5000 feet on Misuku Mountains.

Hemidactylus mercatorius Gray

Hemidactylus mercatorius Gray, 1842, Zool. Misc., p. 68: Madagascar.
Hemidactylus gardineri Boulenger, 1909, Trans. Linn. Soc. London, (2), **12**, p. 296, pl. xl, fig. 4: Farquhar Island, Seychelles.

[1] In these the counts, made from tip to base, run 1 + 8 pairs + 0, 1 + 8 pairs + 1, 1 + 8 pairs + 2, the basal one or two are not always fully developed as a scansor.

Eggshell & yng. (M.C.Z. 50375–6) Nchisi Mtn. 1–3.xii.48.
2 ♂♂, 2 ♀♀, 5 yng. (M.C.Z. 50377–83) Mtimbuka. 16–28.ii.49.
3 ♀♀ (M.C.Z. 50384–6) Chikwawa. 18.iv.49.
2 ♂♂, 4 ♀♀, 3 yng. (M.C.Z. 50387–93) near Tete. 12–28.i.49.

Records. New to Nyasaland, though possibly taken by others and mistaken for the young of *mabouia*.

Native name of Palm Gecko. *Tangulengule* (Nyungwe).

Variation. Upper labials 9–12; lower labials 7–9; preano-femoral pores in *adult* males 30–31; scansor rows under first toe 4–6, under fourth toe 6–9. These last figures are an extension of the former range of 6–7, the fifteen Nyasaland geckos being 6–8, the nine Mozambique specimens 7–9.

At the British Museum I was able to examine the holotype of *mercatorius*, placed in the synonymy of *mabouia* by Boulenger, and discovered that it had 4 scansors under the first toe and 6 under the fourth so that it takes precedence over the species later described by Boulenger as *gardineri*. *H. mercatorius* is often extremely hard to separate from *mabouia* owing to the extensive overlapping. For example the hatchlings from Nchisi do not differ in scale counts from the Nchisi ♂ (M.C.Z. 50362) I have referred to *mabouia* because of its size — 62 mm. from snout to anus. Of the Mtimbuka and Kasumbadedza geckos there can be no question as gravid females were collected and young hatched from small-sized eggs.

Size. Largest ♂ (M.C.Z. 50387), 111 (51 + 60) mm.; largest ♀ (M.C.Z. 50377), 100+ (52 + 48+) mm.; smallest hatched (M.C.Z. 50383), 40 (21 + 19) mm.

Breeding. On December 3, at Nchisi, I found two eggs measuring 9 x 9.5 mm., well separated from each other and two-thirds buried in soil beneath a brick forming part of the border of the old Boma garden; these subsequently hatched (no date) producing geckos measuring 42 (22 + 20) and 43 (23 + 20) mm. respectively.

On January 12, at Kasumbadedza near Tete, two gravid females were taken and a hatchling seen on tree by tent. An egg measuring 8 x 9 mm. hatched on January 28 a 42 (22 + 20) mm. gecko (now M.C.Z. 50393). A second, spherical egg measuring 9 mm. in diameter was carried to Mtimbuka where on February 14 it hatched a 44 (22 + 22) mm. gecko.

On February 8, at Mtimbuka, a pair of eggs measuring 8.5 x 8.5 mm. were found beneath a fallen reed fence surrounding Dr. Lamborn's

garden. On February 28 both hatched and the resulting geckos were released after examination.

On February 16, at Mtimbuka, two pairs of very fresh eggs found beneath stones on rocky hill beside Dr. Fitzmaurice's house, led to my searching the vicinity and securing most of the series listed above.

Enemies. At Kasumbadedza one gecko was recovered from the stomach of a *Boaedon l. lineatus*, another from *Prosymna a. stuhlmanni*.

Habitat. To encounter this gecko at Nchisi was a considerable surprise for in the immediate vicinity there were no palms, and in my experience this species has been always associated with discarded palm fronds though found beneath other vegetable debris. In Nyasaland, the Lilongwe Forestry Officer informs me, palms are almost entirely confined to levels below 3000 feet and none occur at Nchisi so far as he is aware.

Lygodactylus capensis (Smith)

Hemidactylus capensis A. Smith, 1849, Illus. Zool. S. Africa, Rept., pl. lxxv, fig. 3: Kaffirland and districts north of Cape Colony.

Lygodactylus strigatus Gray, 1864e, Proc. Zool. Soc. London, p. 59: Southeast Africa.

Lygodactylus capensis Boulenger (part), 1885d, p. 160; Günther, 1893 (1892), p. 555; Johnston, 1897 and 1898, p. 361; Loveridge (part), 1920a, p. 135; Mitchell (trinomials), 1946, p. 23; Loveridge, 1947a, pp. 208–212.

♂ ♀ (M.C.Z. 50394–5) Nchenachena. 20.xi.48.
2 ♂♂, 6 ♀♀, 2 juv. (M.C.Z. 50396–9) Mtimbuka. 8.ii–5.iii.49.
♂ ♀ (M.C.Z. 50400–1) Chowe. 12.ii.49.
♂ (M.C.Z. 50402) Chiradzulu Mtn. 27.viii.48.
2 ♂♂, 2 ♀♀, 6 eggs (M.C.Z. 50403–5) Blantyre. 3.xii.48.
2 ♂♂, eggs (M.C.Z. 50406–8) Cholo Mtn. 17.iii.49.
♀ (M.C.Z. 50409) Chikwawa. 18.iv.49.
6 ♂♂, 9 ♀♀, 4 juv. (M.C.Z. 50410–9) Near Tete. 8–18.i.49.
6 ♂♂, 1 ♀ ? (M.C.Z. 50420–6) Beira. 17.vii.48.

Records. Fort Johnston (L); Shire Highlands (G); Zomba (L). I personally failed to find this species on Zomba Plateau; some were seen at Kausi, Lake Malombe, 25.ii.49(A.L.).

Native name of Cape Gecko. *Bunyakambalilo* (Nyungwe).

Variation. Rostral entering nostril in 9 geckos, excluded in 31; nasals 2–3; internasal granules 1–2; upper labials 6–9; lower labials 6–8; mental in M.C.Z. 50399 *only* has split off a completely separate shield

instead of being deeply fissured as called for in key; in M.C.Z. 50420 *only* there are 2 postmentals instead of the normal 3; preanal pores in twenty-one males 4–6; subcaudals correspond to key definition for *capensis* with some Beira geckos tending towards the condition found in *grotei*, a species that eventually may have to be relegated to subspecific rank (cf. Loveridge, 1947a, p. 213).

Color. Both color and pattern highly variable. In life the lateral ocelli on the Nchenachena female were so conspicuous and handsome as at first to make me think I had some new form. On the other hand many of the series from the hot and arid country around Kasumbadedza possessed so well-defined a light lateral band, usually black-edged, that I felt sure they must be *grotei* until I had examined their subcaudals.

Size. Largest ♂ (M.C.Z. 50424), 71 (31 + 40) mm., but surpassed in length from snout to anus by a ♂ (M.C.Z. 50406) of 65 (35 + 30) mm.; largest ♀ (M.C.Z. 50416), 64 (31 + 33) mm. The tails of Blantyre geckos are unusually long; for dimensions of smallest, see below.

Breeding. On December 31, at Blantyre, two lots of eggs, cemented together in pairs as is usual, measuring 5 x 7 mm., were found. In each egg of one pair is a small oval opening with neatly bevelled edge that looks as if it might have been drilled by a predatory mollusk.

On January 8, at Kasumbadedza, two hatchlings were running about my tent and a pair of eggs were collected at the base of a tree. (These subsequently hatched in transit and were discarded).

On February 18, at Mtimbuka, eggs measuring 5.5 x 6.5 mm. were found beneath fallen palm fronds. One pair hatched on March 5 two geckos (M.C.Z. 50399a) measuring 25 (13 + 12) mm. and 27 (15 + 12) mm. respectively.

On March 17, at Cholo Mountain, a pair of eggs measuring 6 x 7 mm. were found with adult geckos among debris on a hillside.

Diet. A very large termite was disgorged by one of the Cholo males taken beneath debris at some distance from the nearest bush or tree.

Parasites. Red mites (*Geckobia australis*) are numerous beneath the belly scales of geckos from Blantyre and several other localities. Kasumbadedza geckos suffered from swollen jaws, due to ?calcium deposit.

Habitat. On rocks and trees bordering road to Chiradzulu Boma; on acacias at Mtimbuka; on sapling of *Brachystegia* woodland at Chowe; on domestic bananas at Kausi.

Lygodactylus angularis angularis Günther

Lygodactylus angularis Günther, 1893 (1892), Proc. Zool. Soc. London, p. 555, pl. xxxiii, figs. 1–3: Shire Highlands,[1] Nyasaland. Boulenger, 1894e, p. 722; Boulenger, 1897e, p. 800; Johnston, 1897 and 1898, p. 361; Loveridge (trinomials), 1947a, pp. 221–222.

♀ (A.M.N.H. 67840) Zomba Mtn. v–vi.46.
3 ♂♂, 18 eggs (M.C.Z. 50427–9) Misuku Mtns. 23–30.ix.48.
♂ & egg (M.C.Z. 50430) Nchisi Mtn. 3 & 8.xii.48.
3 ♂♂, 2 ♀♀, 13 eggs (M.C.Z. 50431–6) Zomba Mtn. 2–9.ix.48.
2 ♂♂, 3 ♀♀ (M.C.Z. 50437–9) Chiradzulu Mtn. 26–30.viii.48.
♀ (M.C.Z. 50440) Mlanje Mtn. i.iv.49.

Records. Misuku Mtns. (as Masuku, B); "Nyika Plateau" (B); Shire Highlands "principally upon Mount Zomba and Mount Milanji" (G). As I have now found that the Angle-throated Gecko occurs on both Mlanje and Zomba Mountains it might be advisable to definitely designate the type locality as Zomba Plateau.

Native names. Kakalakasia (Misuku); *zumaili* (Chewa).

Variation. Internasal granules 0–1; nasals surrounding nostril 2–3; upper labials 6–9; lower labials 5–8; postmentals 2–3; preanal pores in males 7–8.

Though the foregoing data extends four of the hitherto recognized ranges of variation (Loveridge, 1947a, p. 200) and shows that 3 mentals is no longer peculiar to the Katanga race *L. a. heeneni*, being present in over 33 per cent of the Nyasaland material listed above, the western *heeneni* males remain recognizable by their possession of from 9–10 preanal pores.

Color in life. ♂ (M.C.Z. 50431). Above, rosy brown, a light-edged crossbar between orbits, a dark line from nostril through eye to above ear, another from eye to ear-opening; a series of velvety black, triangular patches on sides and some dark flecks on limbs and tail. Below, throat orange with blue-black markings, viz. a short line in mental region followed by a V-shaped one and the lateral arms of two incomplete chevrons; breast, belly, and limbs paler orange except around the anus where it is brighter; tail faintly pinkish gray.

♀ (M.C.Z. 50432). Above, as male, but snout paler. Below, yellow rather than orange, and more or less confined to a median band from chin to base of tail, thereafter fainter along basal half of tail; extending backwards from anus is a dark median streak that soon breaks up into a series of dashes.

[1] Here restricted to Zomba Plateau.

Size. Largest ♂ (M.C.Z. 50431), 82 (43 + 39) mm., that measured 88 (46 + 42) mm. in the field; largest ♀ (M.C.Z. 50440), 91 (41 + 50) mm.; on hatching 28 (14 + 14) mm.

Breeding. On August 26 in hot sunshine about 3.30 p.m., at Chiradzulu, a pair were about to mate when disturbed.

On September 9, at Zomba, a ♂ and ♀ were facing each other on a horizontal pole when I saw the ♂, raising himself high upon his forelegs, inflate his handsomely colored throat so as to display the markings.

On September 4, on the hillside above His Excellency's cottage on Zomba Plateau, 13 fresh eggs (M.C.Z. 50436) together with a last year's one that had two holes in it (? parasitized, cf. *L. capensis*) and a recently-hatched eggshell, were found close together beneath a mat of moss and leaves, mostly in a crevice between two large rocks immediately below a grass-grown slope on which were a few scattered trees. Again and again I unsuccessfully searched these trees for geckos. The eggs measured 6.5 x 7.5 to 7 x 8 mm.

On September 23, at Matipa Forest edge, three eggs were found beneath fallen slivers of bark, others under slabs of rock in a forest clearing, and several beneath an abandoned native beehive.

On September 30, at "Mutulambo" (? Maulambo) Forest edge, six eggs under logs. The range of measurements for the 19 eggs taken in the Misuku Mountains is 6.5 x 7, 6.5 x 7.5, 7 x 7.5, 7 x 8, and 7.5 x 8 mm. In size the eggs of *L. a. angularis* are barely distinguishable from those of *H. gardineri* for each egg is separate and distinct, unlike those of *L. capensis* which are cemented in pairs.

On December 3, the discovery of an egg 8 mm. in diameter on a leaf-strewn game trail leading through *Brachystegia* woodland on a slope below the forest, was the first intimation of the presence of this species on Nchisi Mountain.

Enemies. Remains of one *angularis* were recovered from the stomach of a *Thelotornis k. capensis* on Cholo Mountain.

Habitat. This montane species occurs at altitudes ranging from about 2500 to 6500 feet. Though arboreal it is adaptive, dwelling on tree trunks in virgin evergreen forest as well as in *Brachystegia* woodlands or upon the smooth boles of introduced blue gums. Several lived on the walls of Chiradzulu Boma, retiring to the thatched roof; the specimen from Mlanje was shot on the galvanized iron wall of the Power Station in Ruo Valley Forest.

Lygodactylus picturatus picturatus (Peters)

Hemidactylus picturatus Peters, 1870b, Monatsb. Akad. Wiss. Berlin, p. 115: *nom. nov.* for *variegatus* Peters, 1868a, preoccupied.

11 ♂♂, 10 ♀♀ (M.C.Z. 50441–9) near Tete. 8–15.i.49.

Records. Not known from Nyasaland, and previously unknown from Mozambique. In view of Peters having made extensive collections around Tete in 1854 it is almost certain that this common East African species has been introduced since that time. As I (1947a, p. 237) have pointed out, its transportation by human agency, either as egg or adult, has carried it along rivers and railways.

Native name of Yellow-throated Gecko. *Bunyangururu* (Nyungwe, being distinguished from *L. capensis* in the same locality and collected at Tete by Peters).

Variation. Within the range given in my revision (1947a, p. 200).

Color. While in the largest males the chin and throat are wholly black, those of the younger males exhibit a black chevron following the contour of the lower jaw; within this is a solid black marking shaped like a spearhead whose apex points towards the chin while its base is produced posteriorly into three projecting prongs.

Size. Largest ♂ (M.C.Z. 50441), 80 (39 + 41) mm.; largest ♀ (M.C.Z. 50446), 65 (34 + 31) mm.

Habitat. On mopane trees along the banks of the Zambezi River.

Afroedura transvaalica ? transvaalica (Hewitt)

Oedura transvaalica Hewitt, 1925b, Rec. Albany Mus., **3**, p. 350, pl. xvi, fig. 1, pl. xvii, fig. 1: Njelele River, Zoutpansberg District, Transvaal.
Afroedura transvaalica transvaalica Loveridge, 1947a, p. 267.

♂ (M.C.Z. 50450) Kasumbadedza near Tete. 28.i.49.

Records. Unknown from Nyasaland where it should be looked for at dusk along the edges of cracks in rocky outcrops, especially among granitic boulders subject to sunsplit flaking and fissuring. Search should be made near the Mpatamanga Gorge and possibly on rocky hills as far north as southeast Lake Nyasa where associated lizards are known to occur.

Until now the most northerly record for *Afroedura* in the east has been Musami, near Salisbury, Southern Rhodesia ("Northern" Rhodesia in my (1947a, p. 258) key is a lapsus), besides which *t.*

transvaalica is known only from Empandeni, S. R. and the type locality on the northern border of the Transvaal.

Variation. Rostral *widely separated* from the nostril, in which respect this Tete specimen differs from all known *t. transvaalica* and *t. platyceps* (Hewitt). As, however, this character is known to vary in *nivaria* and *tembulica*, description of a new subspecies on the basis of a single character in a single specimen appears unjustified. Exclusion of the rostral from the nostril is characteristic of *A. k. karroica* and its subspecies, but the Tete gecko cannot be referred to *karroica* on account of the more numerous scales in its caudal verticils.

No internasal granules; nostril surrounded by 3 nasals and the first labial; upper labials 9; lower labials 9; ventrals *subhexagonal*, *subimbricate;* caudal verticils with 7–8 scales above, 6 below; preanal pores 8.

Size. Total length 101 (52 + 49) mm.

Habitat. For almost four weeks I had been collecting at Kasumbadedza when this perfect *Afrocdura* was secured almost by accident. After devoting much of the day to packing in preparation for our departure, I paid a last visit to Mwanza rocks in the hope of securing one or two more topotypes of *Platysaurus t. torquatus*. In the rays of the setting sun one was basking beside a thin flaking of rock on a huge granitic boulder by the banks of the Zambezi. I fired and the lizard vanished completely. My gunbearer and I searched assiduously, but in vain. Assuming the reptile must have slipped beneath the huge rock flake, I sent for a stout, six-foot crowbar and after much effort broke away the flake exposing the bewildered *Afrocdura* upon which I pounced with a piece of cotton cloth, then transferred it to a cyanide killing bottle. Though in color and size this gecko resembled a *Hemidactylus mabouia*, its extraordinary flattened body and tail immediately proclaimed it as an *Afrocdura* whose "habit" is an adaptation to its very specialized habitat.

Pachydactylus punctatus punctatus Peters

Pachydactylus punctatus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 615: Sena and Tete, Mozambique.

4 ♂♂, 4 ♀♀, 6 yng. (M.C.Z. 50451–9) near Tete. 12–13.i.49.

Records. Not known from Nyasaland.

Native name. Kasakwi (Nyungwe).

Variation. No internasal granules; nostril surrounded by 3 nasals

(10 ex.) and first labial (4 ex.); upper labials 7–9; lower labials 6–8; no dorsal tubercles; tubercles on either side of tail 2–4, upstanding and conspicuous in males, merely enlarged flat scales in females.

Color. The brown-edged, silvery-white spots on the head and back of the very smallest geckos give rise to the numerous brown flecks (rather than spots) of the adult.

Size. Largest ♂ (M.C.Z. 50451), 62+ (35 + 27+) mm.; largest ♀ (M.C.Z. 50452), 71+ (38 + 33+) mm.

Breeding. On or about January 13, some eggs, approximately 7 x 9 mm. in size, were found beneath drifted debris in a dry watercourse. The shells of two crumbled away as they contained embryos (preserved); another hatched a gecko (M.C.Z. 50459) measuring 40 (20 + 20) mm.

Habitat. After searching in vain for these small geckos beneath boulders and logs, I accidently found them living in a ruinous mud-brick wall not fifty yards from my tent. Against the base of the wall dead leaves had drifted and as I passed by I heard a faint rustle among them. An adult *punctatus* had run towards a hole in the base of the wall outside which it paused. Shining my flashlight in its eyes I picked it up with the forceps. Returning with my gunbearer to hold a cyanide bottle, I caught six more, three of them close together. Subsequently several were found in a rotten log that we demolished; none was brought in by natives.

Pachydactylus capensis oshaughnessyi Boulenger

Pachydactylus oshaughnessyi Boulenger, 1885d, Cat. Lizards Brit. Mus., **1**, p. 204, pl. xvi, fig. 3: Lake Nyasa, Nyasaland. Boulenger, 1891a, p. 306.
Pachydactylus capensis oshaughnessyi Loveridge, 1947a, p. 387.

Records. "Lake Nyassa" (B). After failing to find this species in Nyasaland, I took the opportunity of examining the cotypes in the British Museum whose data is as follows:
No. (18) 77.7.2.15, renumbered 1946.8.22.68, young example from Cape Maclear. A. A. Simons coll. Purchased from same.
No. (18) 77.11.5.1, renumbered 1946.8.22.69, adult from Lake Nyasa Col. B. Thelwall coll. Purchased from Mr. Higgins.

Had I known before that one of the cotypes came from Cape Maclear I would have tried to visit the peninsula which appears to harbor several species of reptiles that have not been taken elsewhere in Nyasaland.

Variation. The enlarged dorsal tubercles of these cotypes described by Boulenger as "arranged rather irregularly," and consequently placed in that section of my key (1947a, p. 342, sect. 21) might just as well be said to "form more or less regular longitudinal rows," a point that can best be settled when more material is available.

Color. The striking pattern in both cotypes consists of one dark-edged whitish crescent on nape, two on the back, and seven on the tail of the young, that of the adult being lost.

Pachydactylus bibronii turneri (Gray)

Homodactylus turneri Gray, 1864e, Proc. Zool. Soc. London, p. 59, pl. ix, fig. 2: "South East Africa," i.e. Tete, Mozambique.

Pachydactylus bibroni turneri Parker, 1936c, p. 129; Loveridge, 1947a, pp. 405–409.

Pachydactylus bibroni Mitchell, 1946, p. 22.

1 (A.M.N.H. 67832) Kasungu. 19–23.viii.46.
8 (M.C.Z. 50460–6) Chitala River. 14–18.xii.48.
2 (M.C.Z. 50467–8) near Tete. 13–22.i.49.

Records. These are the first *definite* locality records for Nyasaland. However, according to Mitchell's ms. it also occurs at Blantyre; Chikwawa; Chiromo; Fort Johnston; Monkey Bay; Port Herald and Zomba.

Native name of Zambezi Gecko. *Sinuda* (Nyungwe).

Variation. No internasal granules; nostril surrounded by 3 nasals; upper labials 9–10; lower labials 6–8; dorsal tubercles in 16–19 rows; postanal tubercles on either side of tail 3–4.

Size. Largest ♂ (M.C.Z. 50462), 165+ (94 + 71+) mm., tail regenerating.

Breeding. Nothing has been recorded regarding the breeding habits of either this race or the South African *bibronii*.

Enemies. At Tete the undigested tails of two Zambezi Geckos were removed from the stomach of a Spotted Wood-Snake (*Philothamnus s. semivariegatus*); the geckos themselves evidently had escaped. The undigested skin of another was recovered from the intestine of a Tiger Snake (*Telescopus s. semiannulatus*).

Temperament. Surprisingly enough, these big geckos seem to be both gentle and sociable, several gathering nightly on the wall around a projecting electric light. I was able to seize them quite easily by shining my torch in their eyes as I did so. Two others shared a room

with a large, though less robust, *Hemidactylus mabouia* but kept to different walls. Though *mabouia* is an aggressive species in my experience, this one showed no inclination to interfere with its big neighbours.

Habitat. I shot one of the Tete topotypes on the trunk of a baobab; the other was brought me by a Kasumbadedza villager who said he had caught it on the wall of his hut. The Chitala series were from European houses.

Pachydactylus tetensis sp. nov.
Plate 5, figure 3

Type. M.C.Z. No. 50469, an adult male from Mwanza rocks on the south bank of the Zambezi River between Kasumbadedza Village and Tete, Mozambique. Collected by Arthur Loveridge, January 22, 1949.

Paratype. M.C.Z. No. 51753, an adult male from Lungsole River, southeastern Tanganyika Territory. Collected by C. J. P. Ionides, March 29, 1948.

Diagnosis. Apparently directly descended from *P. tuberculosus* of Equatorial Africa, with which it agrees in differing from all other forty members of the genus in possessing preanal pores; probably ancestral to *namaquensis* of Southwest Africa with which it agrees in its unusual rostral and swollen nasal ring. Runs down rapidly and correctly to section 40 of my key to the genus (1947a, p. 344).

Description. (Paratype variations in parentheses.) Snout obtuse, prominent; rostral without median groove but with an upward projection entering the greatly (slightly) swollen nasal ring which also comprises 3 (4) nasals and the first labial (excluded); internasal granule 1; granules on snout subconical, keeled, slightly larger than those on occiput, which are intermixed with larger, round, smooth, or rarely stellate tubercles; cheeks swollen; ear-opening moderate, vertically oval; upper labials 11–11 (13–13); lower labials 8–8 (10–10); mental as broad as the adjacent labials; gulars small, flat, imbricate.

Body and lower flanks covered with small, unequal, smooth or feebly striate, juxtaposed granules intermixed with larger, subconical, keeled and stellate tubercles (across back and flanks about 26 (24)) which are so numerous and juxtaposed in the dorso-lateral region as to almost exclude any granules, but form 4 fairly regular longitudinal rows on either side of the vertebral line which is covered by granules or very small tubercles that form a longitudinal band 4 to 5 granules in width;

ventral scales intermediate in size between the dorsal granules and enlarged tubercles; preanal pores in male 13 (12); a pair of tiny postanal slits present, but only one, scarcely recognizable, tooth-like tubercle on base of tail; limbs moderate, stout, the adpressed hind limb reaching beyond the elbow; digits moderately long and slender, more strongly dilated at apex than at base; scansors under first toe 9 + 5 (7) transverse scutes on basal portion, scansors under fourth toe 13 + 8 (12 + 9) transverse scutes on basal portion.

Tail depressed, verticillate, tapering, covered above with small, stellate, juxtaposed, subgranular scales with a pair of pointed, stellate tubercles on either side of the middle line and a third placed laterally at the posterior end of each verticil; below with large, irregular, smooth, imbricate scales of which the median series, except on basal portion, are transversely enlarged (on regenerated half of tail occupying the entire lower surface like subcaudals in an ophidian).

Color in formalin. Above, pale gray, some tubercles paler, others black suggesting obsolescent dark wavy crossbars. Below, pinkish white.

Size. Total length of ♂ holotype, 169 (82 + 87) mm., but the posterior half of the finely tapering tail is regenerated; exceeded by ♂ paratype, 192 (99 + 93) mm., whose tail is also regenerated.

Habitat. Shot at dusk beside a fissure of a rock, a position protected by a shrub that was growing against the rock.

AGAMIDAE

Agama cyanogaster (Rüppell)

Stellio cyanogaster Rüppell, 1835, Neue Wirbelthiere Fauna Abess. Amph., p. 10, pl. v: Massaua, Eritrea.

Agama atricollis A. Smith, 1849, Illus. Zool. S. Africa, Rept., p. 14: Natal, South Africa. Günther, 1893 (1892), p. 555; Johnston, 1897 and 1898, p. 361; Mitchell, 1946, pp. 23, 41.

♂ (A.M.N.H. 67815) Chibotela. 24.viii–8.ix.46.
2 ♂♂, 4 ♀ ♀ (M.C.Z. 50538–43) Chire R. Bridge, N.R. 21.x.48.
2 ♂♂, ♀ (M.C.Z. 50544–6) Chitala River. 15.xii.48.
2 ♀ ♀ (M.C.Z. 50547–8) Nchisi Mtn. 29.xi & 2.xii.48.
♂ & juv. (M.C.Z. 50549–50) Zomba Plateau. 9.ix.48.
♂ (M.C.Z. 50551) Cholo Mtn. 17.iii.48.
♂, ♀ (M.C.Z. 50552–3) Likabula River. 31.vii.48.

Records. Blantyre (M. ms.); Shire Highlands, principally Zomba and Mlanje Mtns. (G).

Native names of Black-necked Tree-Agama. *Chikungwe* (Manganja); *guro* (Chewa; Ngoni). Mitchell gives *nampopo* as the Yao name for this species, but it was supplied to me for *A. m. mossambica* which has also a blue head.

Variation. It is surprising how many characters this, the most distinctive of Nyasaland agamas, has in common with the other three. Back usually without vertebral crest, though a concentration of enlarged keeled scales may form a ribbon-like band in the vertebral region from nape to base of tail and sometimes give rise to a low nuchal crest; midbody scales 100–133; preanal pores in adult males in two rows totaling 19–24, in females in a single row 8–11.

Color in life. Juv. 135 mm. ♀ (M.C.Z. 50550). Above, head plumbeous faintly flecked with black; back and flanks blotched black and gray, the enlarged scales creamy white, limbs chiefly gray with black flecks; tail gray with ten black crossbars 2 to 8 scales in breadth. Below, throat faintly yellowish white vermiculated with satiny pale blue; rest of underparts white, some indistinct dusky markings on chest and sides of belly and dark bars indicated towards end of tail. So closely did this agama resemble a patch of lichen on the tree trunk where it was sunning, that I could not distinguish it until it moved.

A gravid, 203 mm. ♀ (M.C.Z. 50548) sunning on a lichen-covered branch of acacia, showed no blue until after death.

Halfgrown, 228 mm. ♀ (M.C.Z. 50551). Above, crown and sides of head pale blue; back, flanks, and hind limbs flecked with creamy white (on enlarged scales); shoulders pale blue but rest of forelimb black, flecked and crossed with white; tail like back but the black tending to form crossbars particularly towards the tip where are well-defined black bands 6 to 8 scales in breadth. Below, throat gray to blackish but so heavily overlaid with pale blue vermiculations as to appear blue; rest of underparts white conspicuously flecked with black.

Gravid, 258 mm. ♀ (M.C.Z. 50547), basking on bole of tree, was very dark all over, and neither changed color nor moved when shot dead through the head.

Adult, 291 mm. ♂ (M.C.Z. 50549). Above, head turquoise blue; body and limbs cream peppered with black; tail gray, some blue towards tip. Below, chin and throat blue; chest, belly, and limbs cream sparsely flecked with black; tail for first 10 mm. behind anus

white, then darker for 10 mm., the rest straw color with only faint indications of barring.

Wide variation in the rich blue coloring was displayed by the six adults shot on adjacent trees surrounding Chire River rest house.

Size. Largest ♂ (M.C.Z. 50544), 389 (167 + 231) mm., being substantially the same as the Tanganyika record ♂ (M.C.Z. 18283) which measured 405 (165 + 240) mm. in the flesh in 1921, but is now only 385 (155 + 230) mm. Largest ♀ (A.M.N.H. 67815), 287 (127 + 160) mm.

Breeding. On July 31 a ♀ held very small ova.

On October	21	"	"	round ova only 6 mm. in diameter.
On November	29	"	"	8 eggs measuring about 13 x 24 mm.
On December	2	"	"	3 or more " " 12 x 18 mm.
On December	15	"	"	13 eggs " " 16 x 23 mm.

The last lot appeared ready for laying. The last three lizards listed also had a second set of fertilized ova developing. Testes of the ♂ taken on September 9, were very large.

Diet. This Zomba ♂ had, in addition to many ants, an "inedible" grasshopper of the genus *Phymateus* in its stomach; while an Nchisi ♀ held two very large caterpillars; other stomach contents have been identified for me by Dr. W. L. Brown as follows: — The Chire River stomachs consisted almost exclusively of workers, with only a few soldiers, of a small species of *Pheidole;* there were also fragments of a large ponerine, while *Camponotus, Cataulacus, Paratrechina* (?), *Tetramorium* and *Tetraponera* were each represented by a few ants. Of beetles there were only the elytra of a few small species; there were parts of a bee and other hymenoptera; also the unidentifiable remains of an adult hemipteron. The Chitala River agamas had been feeding chiefly on *Polyrhachis* sp., some unidentifiable ponerines, and a few ants referable to *Brachyponera, Tetraponera,* and *Pheidole.* In addition there was a curculionid beetle and some coleopterous larvae.

Parasites. Worms (*Abbreviata* sp., probably *polydentata*) were present in the Chire River agamas, while others, viz. *Abbreviata* spp., probably *polydentata* and *variani* together with fragmentary filarioids, probably *Foleyella* sp., were recovered from the two Nchisi lizards; and *Abbreviata amaniensis* and *variani;* a female fragment probably *Foleyella* sp.; and larvae, probably *Spiura* sp.; and a ♀, probably *Thelandros* sp., were in the Chitala River specimens. I am indebted to Mr. J. T. Lucker for these identifications.

Agama hispida armata Peters

Agama armata Peters, 1854, Ber. Akad. Wiss. Berlin, p. 616: Sena and Tete, Mozambique. Boulenger, 1897e, p. 800; Johnston, 1898, p. 361.
Agama hispida Mitchell (not of Linné), 1946, pp. 23, 41.

♂, juv. (A.M.N.H. 67845–6) Bua River. 30.vii–1.viii.46.
3 ♂♂, 2 ♀♀, 6 juv. (A.M.N.H. 67826–30) Kasungu. 19–23.viii.46.
♀ (A.M.N.H. 67812) Likabula River. 19.vi–18.vii.46.
♂ (M.C.Z. 50546) Chitala River. 16.xii.48.
♂ (M.C.Z. 50490) Mtimbuka. 28.ii.49.
10 ♂♂, 12 ♀♀ (M.C.Z. 50470–89) near Tete. 6–28.i.49.

Records. Misuku Mountains (B); "Nyika Plateau" (B). These records must surely refer to the arid, rocky slopes at lower levels, rather than from 6,000 to 7,000 feet given by Boulenger.

Native names of Zambezi Spiny Agama. *Cigonamatala* (Yao); *dududu* (Nyanja); *tokwe* (Nyungwe).

Variation. Midbody scale rows 72–90; keels on the vertebral series of scales form a low serration in males and sometimes in females, though not in M.C.Z. 50481–2 and 50487–8; ventrals more or less obtusely keeled (quite or almost smooth in the Chitala and Mtimbuka males); fifth toe *usually* (not in M.C.Z. 50486 only) extending as far as first; preanal pores in males 10–14.

Color in life. ♂ (M.C.Z. 50490). Above, crown of head gray but anteriorly, posteriorly, and especially on sides, light blue; back dark gray except for a whitish vertebral band on either side of which are four pairs of blackish blotches; tail gray indistinctly barred with darker. Below, throat grayish, rest of undersurface more or less white darkening on limbs and tail.

Neither this coloration, nor that furnished by Peters (1882a, pl. vii, fig. 2), resemble the cryptic sandy-rufous coloring of the series of Tete topotypes. Unfortunately I neglected to record this in the field as I (1923h, pp. 942–3) had already done so for Tanganyika specimens of both male and female, though under the wrong subspecific name. See remarks below under *Temperament.*

Size. Largest ♂ (M.C.Z. 50470), 241+ (93 + 148+) mm.; largest ♀ (M.C.Z. 50480), 246 (92 + 154) mm., though surpassed 2 mm. in body length by another with truncated tail.

Breeding. Testes of Chitala ♂ very much enlarged. All twelve Tete females are bloated and undoubtedly gravid; five examined held from 12 to 20 eggs ranging from about 8 mm. in diameter to others

measuring 9 x 13 mm. and apparently ready for laying. The monsoon rains were expected daily.

Diet. Stomach contents of five Tete females have been identified and summarized for me by Dr. W. L. Brown as follows: Hymenoptera of family Formicidae — half to three-quarters of the stomach contents of each agama consisted of *Camponotus* spp. females; *Tetramorium* sp. females were numerous; *Pheidole* sp. minor workers plentiful; *Crematogaster* spp. present; and a few other undetermined genera of Cerapachyine, Myrmicine, and Ponerine affinities. Coleoptera remains consisted chiefly of broken elytra, in addition two damaged beetles referable to the Staphylinidae and Tenebrionidae. Hemiptera — remains of heteroptera are apparently all representatives of one species. Orthoptera — the head and legs of a small mantis nymph.

Parasites. Mites (*Pterygosoma ? aculeatum*) on Mtimbuka male. Worms (*Polydelphis* sp. ♀ ; *Strongyluris* sp. ♀ ; *Thelandros* sp. ♀ ; a *Thubunaea*, probably *agamae;* and a cestode (*Oochoristica* sp.), the last mentioned having been determined by Mr. Allen McIntosh.

Temperament. These agamas, irrespective of sex, rely to such an extent on their cryptic coloration harmonizing with their environment of reddish rock and sand as to convey the impression of being extremely lethargic, quite belied by the bursts of speed of which they are capable. The following notes are quoted in illustration.

"At 6 a.m. this morning, the temperature being 80°, I paused to put cotton wool in the mouth of a bird I had just shot. The wool for this operation was being held out as required by an African who was carrying my haversack. As I handed him the bird and was about to turn away, he remarked: "What about this?" indicating an agama lying right between our feet. I had entirely failed to notice it, so closely did the lizard's coloring approximate to the sandy ground on which it was resting. Only when I picked it up did this gravid female show any signs of life. (Kasumbadedza, 6.i.49).

"About 5 p.m., the temperature being around 90°, my gunbearer invited attention to a motionless male agama whose forward half was upraised against a stone. It was so close I had to retreat a further six feet or so before firing at it with dust shot, when, still motionless, it fell over dead with a bullet through the brain" (Kasumbadedza, 12.i.49).

Agama mossambica mossambica Peters

Agama mossambica Peters, 1854, Ber. Akad. Wiss. Berlin, p. 616: Coast of

Mozambique between 7° and 20° S. latitude. Günther, 1893 (1892), p. 555; Johnston, 1897 and 1898, p. 361.

3 ♂♂, 3 ♀♀, 4 juv. (M.C.Z. 50507–16) Likabula River. 29–31.vii.48.
6 ♂♂, 9 ♀♀, 3 juv. (M.C.Z. 50520–37) Ruo River. 1–8.iv.49.

Records. Shire Highlands, principally Mlanje and Zomba Mtns. (G).

Native names of Mozambique Tree-Agama. *Nalimata* (Nyanja); *nampopo* (Yao, but applied to *cyanogaster* according to Mitchell).

Variation. Midbody scale rows 72–94 (69–85 in type series, *fide* Peters); keels on the vertebral series of scales form a nuchal and usually a very low vertebral crest though sometimes scarcely discernible in females; ventrals subequal to dorsals, obtusely or even strongly keeled and mucronate; fourth toe scarcely (M.C.Z. 50512 only) or slightly longer than the third, fifth toe usually extending (sometimes scarcely as on right foot of M.C.Z. 50510) a full claw length beyond the first; preanal pores in males 10–14, often indistinct.

Color in life. ♂. Above, crown of head, around eyes, and upper lip bronze, rest of head ultramarine; back blackish except in vicinity of vertebral crest which is light metallic green, dorso-lateral region, flanks, and limbs flecked with fawn; otherwise limbs blackish, feet lighter; tail gray with fourteen indistinct crossbands (Likabula River, 31.vii.48).

Unfortunately the coloring of the underside was not recorded, but it lacked the brick red band across the throat found in the form described as *montana* Barbour & Loveridge, which re-examination reveals should be regarded as a distinct species, a matter with which I hope to deal at a future date.

Size. Largest Likabula ♂ (M.C.Z. 50507), 254 (93 + 161) mm.; largest Likabula ♀ (M.C.Z. 50509), 185 (70 + 115) mm.; largest Ruo ♂ (M.C.Z. 50520), 173 (66 + 107) mm.; largest Ruo ♀ (M.C.Z. 50524), 181 (68 + 113) mm.

Breeding. No sign of developing eggs in the ♀♀ examined.

Parasites. Orange-colored mites (*Pterogosoma triangulare; Schongastia gerhosauri; Trombicula montensis*) are numerous in the deep pockets of the gular fold anterior to the black spot on shoulder; in one stomach was an insect parasite (*Mermithoidea*) presumably ingested by the lizard, while nematodes (*Abbreviata amaniensis; A.* sp., probably *polydentata*) were recovered from several stomachs. In an *Agama m. mossambica* from Liwale, Tanganyika Territory, used for comparative purposes, three species of *Abbreviata*, probably

amaniensis, *polydentata* and *varani*, were present.

Habitat. On the morning of April 8, not far from the Ruo River, eleven ♀♀ and young were shot as they basked on the trunks of small trees in a streamside area that was being cleared of underbrush.

Agama kirkii kirkii Boulenger

Agama kirkii Boulenger, 1885d, Cat. Lizards Brit. Mus., **1**, p. 354, pl. xxviii, fig. 2: Zambesi Expedition. Günther, 1893 (1892), p. 555; Bocage, 1896a, p. 103; Johnston, 1897 and 1898, p. 361; Mitchell, 1946, p. 23.

♀, juv. (M.C.Z. 50505–6) Mtimbuka. 16.ii.49.
♂ (M.C.Z. 50491) near Mpatamanga Gorge. 31.i.49.
juv. (M.C.Z. 50492) Chiradzulu Mtn. 27.viii.48.
5 ♂♂, 4 ♀♀, 3 juv. (M.C.Z. 50493–504) Likabula R. 29–31.vii.48.
3 hgr. ♂♂ (M.C.Z. 50517–9) Ruo River. i.iv.49.

Records. Blantyre (M); Shire Highlands (G); Zomba (M). Johnston (1898, p. 356) is referring to *A. kirkii* when he writes of "*colonorum* or a closely related species," but his description is that of the West African lizard.

Variation. Midbody scale rows 98–118 (99 in holotype); nuchal and vertebral crests well developed; ventrals subequal to dorsals, smooth or obtusely keeled and mucronate; fourth toe very slightly longer than third, fifth toe extending a full claw length beyond the first, preanal pores in males 11–16, distinct.

Color in life. ♂ (M.C.Z. 50493). Above, crown of head brown and brick red, lores and around eyes orange red; nape orange red flecked with yellow; vertebral crest white with scattered white scales on either side of it; dorso-lateral region dark bluish black turning paler on flanks as it merges into the belly coloring; upper arm pale blue, lower darker; hind limbs and tail greenish flecked with black, the latter with more than a score of narrow (one-scale wide) white annuli around its posterior two-thirds. Below, throat brownish orange to orange red flecked and streaked with cream in a series of longitudinal lines enclosing a dark navy-blue basal patch of variable shape; breast ultramarine flecked with white fading to grayish blue in centre of belly; limbs bluish to whitish, soles of feet white; tail greenish showing light annuli.

In the three halfgrown ♂♂ (57–65 mm. from snout to anus) the throat is predominantly white with dusky lines that are continued over breast and belly.

Largest ♀ (M.C.Z. 50505). Above, crown of head mixed brown and pale blue, beneath eyes brown but upper lip blue; nape and back with four broad, bright red, hollow-centred crossbars which coalesce on flanks to form a reddish network; back, limbs, and tail lemon yellow, the latter with about a dozen crossbars, end of tail dark. Below, dirty white, some pale blue on edges of jaws, several longitudinal dusky lines and a dusky basal patch on throat.

This agama, when shot, was various shades of dark brown in harmony with the tree trunk on which it was basking about 10 a.m.; it assumed the handsome coloring noted above soon after death. The young juvenile was one of several all-brown ones seen running about the rocks adjacent to the tree.

Size. Largest ♂ (M.C.Z. 50491), 315 (105 + 210) mm.; largest ♀ (M.C.Z. 50505), 242 (92 + 150) mm.; smallest (M.C.Z. 50506), 96 (36 + 60) mm. Head and body length included in that of complete tails (1.5–1.7 times in juveniles, 1.6–1.7 in ♀ ♀, 1.6–2.0 in ♂ ♂).

Breeding. On February 16 the large ♀ held very small ova.
On July 29–31 all three ♀ ♀ held very small ova.

Diet. Examination of the stomachs of several Likabula River agamas by Dr. W. L. Brown, revealed that termites (workers, soldiers and sexual castes) were the chief food, with a few fragmentary ants of the genera *Pheidole, Tetramorium* and an unidentified dolichoderine genus present, besides a small acridioid grasshopper and a number of small hemipterans. The stomach of the Mtimbuka female was distended with large black ants.

Parasites. Red Mites (*Pterygosoma aculeatum*) were numerous along either side of the breast and belly of the Mtimbuka ♀, and nematodes (*Abbreviata amaniensis; A.* sp., probably *polydentata; Strongyluris* sp., probably *brevicauda*) were recovered from Likabula River lizards.

Habitat. All were on rocks or boulders with the exception of the Mtimbuka ♀, which was on a tree trunk.

CHAMAELEONIDAE

Chamaeleo dilepis isabellinus Günther

Chamaeleon isabellinus Günther, 1893 (1892), Proc. Zool. Soc. London, p. 556, pl. xxxiii, fig. 2: Shire Highlands, Nyasaland. Bocage, 1896a, p. 103; Johnston, 1897, p. 361; 1898, p. 361a; Monk, 1903, p. 323.

♀ (A.M.N.H. 67806) Likabula R. 19.viii–18.ix.46.
2 ♂♂, 3 ♀♀, 3 juv. (M.C.Z. 50630–7) Likabula R. 27–31.vii.48.
♀ (M.C.Z. 50638) Ruo River. 8.iv.49.
2 ♀♀, 1 juv. (M.C.Z. 50639–41) Cholo Mtn. 11.iii.49.

Records. Parker (1942, p. 79) has recently clarified the position of this race by revealing that the Somaliland form *C. d. ruspolii* Boettger, is not synonymous with *isabellinus* as was stated by Boettger in 1893, but perfectly distinguishable.

Lönnberg's (1911, p. 19) record from Meru Boma in Kenya Colony, is probably in the same category as the individuals from Dodoma and Gulwe, Tanganyika Territory, which I (1920a, p. 163) referred with a query to *isabellinus*. Re-examination shows these isolated examples to be more or less indistinguishable from *isabellinus*, but the series of Dodoma chameleons secured subsequently (1928d, pp. 66–67), by their large size approach in appearance those here referred to *petersii*. The entire group is in much need of painstaking study, but their variability is such as to make the task of reducing them to readily recognizable races appear almost hopeless.

Variation. Dermal lobe with 4–5 scales, including small marginals, in a horizontal series; hind feet of both males exhibit, though somewhat indistinctly, the so-called dermal spurs.

Size. Larger ♂ (M.C.Z. 50630), 142 (71 + 71) mm.; largest ♀ (M.C.Z. 50640), 276 (137 + 139) mm.

Breeding. On March 11, at Cholo, both adult ♀♀ appeared spent. On April 8, at Ruo, the only ♀ held 36 eggs measuring *ca.* 12 x 7 mm. Between July 27–31 and again from mid-August to mid-September, at Likabula River, a total of four ♀♀ held small ova.

Diet. A green shield bug and three large green caterpillars in the stomach of a Likabula specimen.

Enemies. Two recovered from stomachs of Cape Vine-Snakes (*Thelotornis k. capensis*) at Cholo.

Chamaeleo dilepis dilepis Leach

Chamaeleo dilepis Leach, 1819, in Bowdich, Miss. Ashantee, App. p. 493: French Congo (Gabon). Mitchell (part), 1946, pp. 25, 41.

Chamaeleon dilepis var. *parvilobus* Günther (not Boulenger), 1893 (1892), pp. 555.

Chamaeleon quilensis Bocage (not Bocage, 1866), 1896a, p. 103.

Chamaeleon dilepis Boulenger, 1897e, p. 800; Johnston, 1897 and 1898, p. 361.

Chameleon ? sp. Benson, 1949, Ann. Transvaal Mus., **21**, p. 160.

♂, 6 ♀ ♀ (A.M.N.H. 67816–22) Chibotela. 24.viii–8.ix.46.
3 ♂♂, ♀ (A.M.N.H. 67841–4) Nchisi Mtn. 23.vii–13.ix.46.
15 ♂♂, 20 ♀ ♀ (M.C.Z. 50557–91) Misuku Mtns. 24–30.ix.48.
4 ♀ ♀ (M.C.Z. 50592–5) Nchenachena. 20.xi.48.
♀ (M.C.Z. 50596) Mzimba. 23.xi.48.
5 ♂♂, 3 ♀ ♀ (M.C.Z. 50597–604) Nchisi Mtn. 1–8.xii.48.

Records. Fort Hill (B); Karonga to Kondowe (B); Misuku Mtns. (as Masuku Plateau, B); Nkata Bay to Ruarwe (B); Nyika Plateau (B); Shire Highlands (G). Perhaps this last should be excluded though it is listed in the same paper in which *isabellinus* is described.

Native names of the Flap-necked Chameleon. *Bilimankwa* (Chewa; Ngoni); *nazikambi* (Manganja; Nyanja) corroborating those given by Mitchell (1946, p. 41) though with variations in spelling; *nifwi* (Misuku).

Variation. C. parvilobus Boulenger (1887a, p. 449, pl. xxxix, figs. 5–5a) is a synonym of *C. d. quilensis* Bocage, and I have previously (1936j, p. 332) pointed out that the dermal lobes of immature *C. d. dilepis* appear indistinguishable from those of adult *quilensis*. Many of the younger chameleons listed above might well be identified as *C. d. quilensis*, and I imagine that this is what led Günther (1893, p. 555) to record *parvilobus* from Nyasaland.

Dermal lobe with 6–8 scales, including small marginals, in a horizontal series; hind feet of all twenty-five males exhibit so-called dermal spurs, lacking in females, all of which have been sexed by dissection.

Size. Largest ♂ (M.C.Z. 50600), 195 (105 + 90) mm.; largest ♀ (M.C.Z. 50596), 276 (150 + 126) mm. Smallest juvenile, a ♂ (M.C.Z. 50570), 109 (60 + 49) mm.

It is quite possible that the four largest females (120–127 + 97–124 mm.) in the Misuku Mountain series, were brought up from lower altitudes, and that the 14 ♂♂ (60–93 + 49–85 mm.) and remaining 15 ♀ ♀ (72–107 + 62–98 mm.) represent the dwarfing effect of life at higher altitudes with consequently lower temperatures. The rest of the series come from altitudes ranging from 1700–4500 feet.

Breeding. During Sept. 24–30 the ova of 20 ♀ ♀ were undeveloped.
On Nov. 23 the ova of one ♀ measured 6 mm.
Between Dec. 1–8 the ova of two ♀ ♀ were undeveloped, while that of a third measured about 4 mm. in diameter. In this week the testes of all males taken were much swollen.

Enemies. Probably it was this common and widely distributed form that in 1949, Benson mentions finding in the stomach of a

South African Cuckoo-falcon (*Aviceda cuculoides verreauxi* at Mpata. One was recovered from the stomach of a Vine-Snake (*Thelotornis k. capensis*) in the Misuku Mountains; at Mzimba a large female fell from a tree together with a Boomslang (*Dispholidus typus*) to whose poison it succumbed; two other large chameleons had been swallowed by Boomslangs at Nchisi on December 8 and 10.

Chamaeleo dilepis petersii Gray

Chamaeleon petersii Gray, 1864, Proc. Zool. Soc. London, p. 470: Mozambique.
Chamaeleon dilepis Günther, 1894a (1893), p. 618.
Chamaeleo dilepis Mitchell (part), 1946, p. 25.

2 ♀♀ (M.C.Z. 50605–6) Chitala R. 14.xii.48.
7 ♂♂, 4 ♀♀, 1 juv. (M.C.Z. 50607–18) Mtimbuka. 7–17.ii.49.
10 ♂♂ (M.C.Z. 50620–9) near Tete. 12–25.i.49.

Records. Presumably the Chikwawa chameleon seen twenty feet up a tree by Mitchell (1946, p. 25), who estimated its length at 14 inches, belongs to this form. Even if his estimate is correct, however, it does not constitute a record, for a ♂ and ♀ from Morogoro, Tanganyika Territory, measuring 13 3/8 and 14 1/2 inches respectively, were recorded many years ago by me (1920a, p. 161), and larger ones since.

Native names of the Giant Flap-necked Chameleon. *Naluwi* (Yao); *dwidwi* (Nyungwe).

Variation. Dermal lobe with 6–7 scales, including small marginals, in a horizontal series; except in M.C.Z. 50616 and 50625 where it is 4–5 and 5 respectively; hind feet of all males exhibit so-called dermal spurs, though sometimes very indistinctly developed.

I employ the name *petersii* for these huge chameleons from the hot lowlands at altitudes ranging from 250 to 1,550 feet, as it seems impossible to regard them as subspecifically identical with the smaller reptiles of the uplands. Yet separation on size alone is likely to create difficulties, for from Mbanja, north of Lindi, I have recorded a ♀ of 390 mm., and one of 370 mm. from Morogoro. Moreover at Mbanja there appeared to be a colony of the giant form surrounded by those of more moderate dimensions.

Size. Largest ♂ (M.C.Z. 50621), 348 (172 + 176) mm.; largest ♀ (M.C.Z. 50614), 341 (185 + 156) mm. and another ♀ (M.C.Z. 50605), also 341 (175 + 166) mm. Fifteen of the seventeen ♂♂ and four of the six ♀♀ are over 300 mm., the smallest (M.C.Z. 50618), 98 (48 + 42) mm.

For measurements of the Mozambique cotypes of *petersii* mentioned by Boulenger (1887a, p. 451) I am indebted to Mr. C. J. Battersby, who finds that all four (B.M. 1946.9.8.17. coll. W. Peters; B.M. 1946.8.3.67–69. coll. McLeod) are females which, in corresponding order to the above numbers, measure: 268 (135 + 134) mm., 295 (149 + 147) mm., 322 (170 + 152) mm., and 320 (165 + 154) mm. He points out that the apparent discrepancy in total lengths is due to their having been measured independently to those of their respective head-and-body or tail.

Breeding. Testes of all the ♂♂ very large, ovules in the ♀ ♀ small.

Enemies. One very large ♂ was killed by the poison of a Boomslang (*Dispholidus typus*) at Tete.

Aestivation and *Hibernation.* It is curious to note that males only were taken at Kasumbadedza during January, a very hot month with daily temperatures of 100° when the expected monsoon rains failed to materialize. One chameleon was found with head protruding from a hole in the sandy bank of a dry river bed. Next day I dug another from near the base of a tree growing in the middle of another dry watercourse. This chameleon was completely buried in sand, above which was piled flood debris that had lodged against the base of the tree (12 & 13.i.49).

From May to October Mitchell (1946, p. 25) found chameleons scarce on the lower reaches of the Shire, and suggests they were hibernating, as in August he found one beneath a stone in Southern Rhodesia.

Habits. On February 25, in the course of a sixty-mile run from Mtimbuka to Kausi and back, four chameleons were seen crossing the road. Two of them between 3 and 4 p.m. on a sunny afternoon, so that Mitchell's (1946, p. 26) limiting of such peregrinations to the forenoon is not justified.

Chamaeleo melleri (Gray)

Plate 2, figures 1–2

Ensirostris melleri Gray, 1864, Proc. Zool. Soc. London, p. 478, p. xxxii, fig. 1: "Mountains in the interior of East Africa." now restricted to Zomba, Nyasaland.

Chamaeleon melleri Boulenger, 1887a, p. 472; Günther, 1894a, (1893) p. 618; Johnston, 1897 and 1898, p. 361; Mitchell, 1946, pp. 25, 41.

7 ♂♂, 2 ♀♀, 2 juv. (A.M.N.H. 67797–805, 67807–8) Likabula R. 1946.
♂ (M.C.Z. 50642) Zomba Plateau. 10.ix.48.
♀ hgr. (M.C.Z. 50643) Blantyre. 15.iv.49.
♀ (M.C.Z. 50644) Cholo Mtn. 24.iii.49
2 juv. (M.C.Z. 50645–6) Ruo River. 1.iv.49.

Records. The somewhat vague type locality may be restricted to Zomba which is the type locality of *Rhynchogale melleri* (Gray), for Dr. J. C. Meller, a medical missionary, apparently only visited the Lower Shire and Shire Highlands during the two years or so that he spent in Nyasaland. "Occurs only in the Shire Highlands," according to Mitchell. Certainly the five localities listed above are covered by this statement, but as the species is known from Mozambique and the coastal belt of Tanganyika (13 localities) inland to Kilosa, it may be looked for in the lowlands of Nyasaland.

Native names of the Giant One-horned Chameleon. *Kalilombe* (Ngoni); *kanganjoru* (Manganja).

Variation. In the two youngest (A.M.N.H. 67807–8) the rostral horn scarcely projects above the bony base which is little more than a swelling on the snout of chameleons with an overall length of 124–141 mm.

Size. Largest ♂ (A.M.N.H. 67798), 595-(18 + 270 + 307) mm., is apparently the record for this almost two-foot species; largest ♀ (M.C.Z. 50644), 432 (207 + 225) mm., smallest specimen (A.M.N.H. 67808), 124 (61 + 63) mm.

Breeding. In all five females, four being subadult, the ovules are undeveloped. Mr. J. R. Lennon of Zomba, however, tells me that one of his *melleri* laid 70 eggs, though he considers the average nearer 50. He photographed the eggs being laid, and later stages where the young are emerging from the buried eggs, and climbing twigs stuck in the ground nearby. Unfortunately these photographs were not clear enough for reproduction.

Diet. The stomach of the male from Kasonga Village on Zomba Plateau held the wings of two large dragonflies (? *Aeschna*) and the remains of many grasshoppers; the stomach and intestines of the Cholo female were crammed with large black ants, some of them winged; the young Ruo chameleons held much-chewed fragments of Diptera, a few vegetable fibers and bits of bark, the largest about 10 mm. in length.

Mr. C. J. Ionides writes me (31.viii.48) that he saw a captive *melleri* seize and swallow two very young chameleons; later other persons saw it take a dozen more. These fourteen young were born of a mother

which shared the vivarium with *melleri;* the witnesses thought she was a *dilepis*, but as that species is oviparous it is more probable that they were the offspring of the local *jacksonii* whose female is often hornless and viviparous.

Mr. J. R. Lennon, to whom I am indebted for the photograph reproduced on plate 2, figure 1, informs me (19.xi.46) he has another photograph of a small weaver bird (*Lagnosticta senegala rendalli*) being swallowed head first by one of these giant chameleons.

Parasites. Nematode worms in the Ruo chameleons.

Chamaeleo goetzei nyikae subsp. nov.

Type. M.C.Z. No. 50554, a gravid ♀ from the Nyika Plateau, directly above Nchenachena at about 7500 feet, Nyasaland. Collected by Arthur Loveridge, November 16, 1948.

Paratypes. ♂ ♀ (M.C.Z. 50555–6) Nyika Plateau. November 1–17, 1948. Loveridge coll. ♀ ♀ (A.M.N.H. 67847–8) Nyika Plateau between the camp and the juniper forest. Collected by Dr. L. J. Brass, August 11, 1946.

Diagnosis. No well-defined, slit-like, gular pouches.....*g. nyikae*
A well-defined, slit-like, gular pouch on either side of the throat immediately beneath the lower jaw.....*g. goetzei*

Remarks. On being shown the first of these chameleons in camp, I immediately noticed the absence of the gular pouches that are so prominently displayed by freshly-captured *goetzei* in the mountains of southern Tanganyika Territory, where I captured over eighty of them in 1930. When the other two Nyika specimens were taken I examined both of them for this character, and subsequently in the laboratory all five Nyika chameleons were found to lack these deep skin folds present in preserved material of the typical form. In other respects they resemble the typical form so closely that a detailed description appears unnecessary.

Absence of movable dermal lobes distinguishes them immediately from all other members of the genus known to occur in Nyasaland.

Size. Total length of ♀ holotype (M.C.Z. 50554), 157 (80 + 77) mm. Only ♂ (M.C.Z. 50555), 121 (60 + 61) mm.; largest ♀ (A.M. N.H. 67848), 181 (87 + 94) mm.

Habitat. This species, never before recorded from Nyasaland, must be rare on the inhospitable Nyika where only in the marshy bottoms can it be expected to escape the devastating grassfires that periodically

sweep across these uplands. Though constantly on the lookout for chamelcons during our three weeks stay on the plateau, we found but three. First the ♂, collected by my wife on a low plant in a soggy bottom to the left of the path shortly before reaching our camp at 7,500 feet. As further search proved fruitless I got her to take me and two Africans to the place where, after an hour's hunt the type was found deep in the heart of a fern where it was sloughing its cuticle. The following day Mrs. Loveridge found an immature female crossing the main path that traverses the Nyika; this was taken a mile or two beyond our camp.

Brookesia versus *Rhampholeon*

It was hoped that the results of the anatomical studies on these genera being undertaken by staff and students of the University of Stellenbosch, would have been completed before this paper went to press. Unfortunately the investigations are still in progress (cf. Frank, G. H., 1951, Ann. Univ. Stellenbosch, **27**, A, pp. 33–67).

In my (1951a, Bull. Mus. Comp. Zool., **106**, p. 180) earlier comments on the situation, I implied that Parker (1942, p. 80) had studied only a single representative skeleton of each group; actually he investigated three *Brookesia* and a number of both Malagasy and mainland *Rhampholeon*, as will be seen by reference to p. 82 of his paper. However, in view of the apparent impossibility of separating the two groups on external characters, my own inclination is to regard them as subgenera of *Brookesia*.

Brookesia nchisiensis sp. nov.

Plate 3, figure 1

Brookesia platyceps Loveridge (not of Günther), 1933, Bull. Mus. Comp. Zool., **74**, p. 343 (material from Ukinga, Poroto and Rungwe Mountains, Tanganyika Territory.)

Native name. *Nifwi* (Misuku); apparently no name in Chewa or Ngoni.

Type. M.C.Z. No. 50681, a gravid female from Nchisi Forest, 5000 feet, Nchisi Mountain, Nyasaland. Collected by Arthur Loveridge, December 1, 1948.

Paratypes. 2 ♀♀ (M.C.Z. 50682–83) Nchisi Mtn. 1–2.xii.48.
Juv. & 3 ♀♀ (M.C.Z. 50677–80) Misuku Mtns. 27.ix–16.x.48.

together with all the Tanganyika material mentioned in the above citation.

Diagnosis. Twenty years ago when I submitted one of these Tanganyika specimens to Dr. H. W. Parker for comparison with *platyceps* and *brachyura*, then unknown outside the scant material in the British Museum, it was thought inadvisable to describe them. Now, having seen all the British Museum and other material for myself, it is realized that *nchisiensis* differs from all other Nyasaland species by lacking both axillary and inguinal pits. Several additional differences are set forth in the key on page 307 of the present paper. Sections 6 to 8 of this key, embodying two new forms, replace section 6 *only* of the Key to African *Brookesia* published in 1951 (Bull. Mus. Comp. Zool., **106**, pp. 181–182).

Description. Snout terminating in a flexible rostral process; supraciliary ridge composed of enlarged pointed granules of which one is occasionally horn-like; interorbital region with a somewhat angularly arranged transverse series of enlarged granules; vertebral line weakly crenulated at regularly spaced intervals with the humps bearing granules that are not, or but slightly, larger than those in the intervening hollows; flanks covered with minute granules and very small scattered tubercles; *no axillary or inguinal pits.*

Size. Total length of type ♀ (M.C.Z. 50681), 83 (67 + 16) mm.; of largest paratype ♂ (M.C.Z. 31380) from Nkuka Forest, Rungwe Mtn., 56 (43 + 13) mm. Nyasaland specimens average larger than those from southern Tanganyika where it is wetter and the extensive forests cooler.

Breeding. The following notes were made in Nyasaland.

On September	27,	a ♀	held	12	ova	measuring about 8 x 5 mm.
"	27,	"	"	12	"	" " 8.5 x 5 mm.
October	16,	"	"	15	"	" " 9 x 5.5 mm.
December	1,	"	"	14 (+ 1 already laid)	"	11 x 7 mm.
"	1,	"	"	8 (+ 6 already laid)	"	12.5 x 7 mm.

On December 1, having overturned a tree trunk lying in a leaf-strewn clearing in the very heart of Nchisi Forest, I saw a solitary egg measuring 11.5 x 7 mm. I remarked that the lizard which had laid it must be found, for already we had turned fully forty logs in the forest and dug beneath them without discovering a single reptile or amphibian. A moment later, among the dead leaves that had drifted against the log, I observed an olive-colored *Brookesia*. I picked it up and my gunbearer started raking aside the leaves where it had been,

uncovering 6 more eggs of the same size as the one already found, each two-thirds buried in the rich black loam and well-separated from its nearest neighbor. Postulating that such fresh-looking eggs must have been laid by the reptile I had caught (which subsequent dissection revealed as holding 8 more), I said the solitary egg must have been laid by yet another pygmy chameleon which, after intensive search, we discovered and found she held 14 eggs still to be laid. Opening the solitary egg I noted that it contained an embryo, as was the case with the unlaid ones. On December 2, a third gravid ♀, with embryos in her eggs, was found among leaves lying against a log in another part of the forest.

Enemies. The stomachs of each of two male Vine-Snakes (*Thelotornis k. capensis*) brought in on October 16, yielded two gravid *Brookesia*, one much digested, the other (M.C.Z. 50680) worth preserving.

Parasite? On the right flank of M.C.Z. 50681 was a large skin-covered protruberance that I supposed harbored a dipterous larva, but my colleague, Dr. J. C. Bequaert, after removing the top of the swelling, failed to find any trace of a parasite.

Habitat. A tiny chameleon, measuring only 26.5 mm. over all, was found lying on the ground at the base of a wild banana from which we had been stripping the outer leaves, one of a group of plants surviving beside a stream at the forest edge. Similarly a gravid female was taken beneath a wild banana in a ravine in Matipa Forest. In conjunction with the breeding records of this species, it seems certain that it is a forest, or forest-edge form.

Brookesia brachyura brachyura (Günther)

Rhampholeon brachyurus Günther, 1893 (1892), Proc. Zool. Soc. London, pp. 555, 557, pl. xxxiv, figs. 2–2a: Shire Highlands, Nyasaland. Günther, 1894a (1893), p. 619; Boulenger 1894e, p. 725; Bocage, 1896a, p. 103; Johnston, 1897, p. 361; 1898, p. 361a; Monk, 1903, pp. 326, 327.
Rhampholeon brevicaudata Mitchell (not of Matschie), 1946, p. 26.

Type	? ♀ (B.M. 92.12.31.22) Shire Highlands.	37 + 7 mm.
"	? ♀ (B.M. 92.12.31.23) Shire Highlands.	26 + 5 mm.
	♂ (B.M. 93.10.26.36) Zomba (H.H.J.)	28 + 8 mm.
	♀ (B.M. 47.1.3.83) Mudi R., Blantyre.	41 + 8 mm.
	♂ (M.C.Z. 52131) Nansadi R., Cholo	46 + 7 mm.
	♀ (M.C.Z. 52132) Nansadi R., Cholo	46 + 8 mm.

Records. Shire Highlands (G); Zomba (Mitchell, specimen now believed to be in the National Museum at Bloemfontein).

Variation of the six specimens listed above; studied at the British Museum. Trinomials are used because of *B. b. ionidesi* Loveridge, 1951, of southeast Tanganyika Territory which differs in lacking the numerous strongly developed granular tubercles displayed by the typical form. Snout without a terminal rostral process; supraciliary ridge, at least anteriorly, composed of prominent, often spine-like, granular tubercles; interorbital region *without* a transverse series of enlarged granules; vertebral line *not*, or but indistinctly, crenulate, many of its component granules enlarged, conical, but not grouped; flanks covered with minute granules and scattered tubercles; a small pit beneath forearm but *none* in groin.

Size. As given above.

Breeding. Both the Mudi and Nansadi River ♀ ♀ are gravid, the latter, received at the Zoological Gardens, London, on March 23, but date of death unknown, holds 6 eggs measuring about 9.5 x 5 mm. and apparently almost ready for laying.

Habitat. Mr. Mitchell informs me that he collected the three chameleons in gallery forest along the Mudi and Nansadi rivers. The former at a point just below Blantyre Golf Course, the Nansadi reptiles at Mikolongwe — which is about 12 to 14 miles from Limbe.

Brookesia platyceps platyceps (Günther)

Rhampholeon platyceps Günther, 1893 (1892), Proc. Zool. Soc. London, pp. 555, 556, pl. xxxiv, figs. 1–1a: Shire Highlands, Nyasaland. Günther, 1894a (1893), p. 619; Boulenger, 1894e, p. 725; Bocage, 1896a, p. 103; Johnston, 1897, p. 361; 1898, p. 361a; Monk, 1903, pp. 326, 327; Werner, 1911, p. 47; Mitchell, 1946, p. 27.

Type	♀ (B.M. 92.12.31.21)	Shire Highlands.	50 + ?, tail lost
	♂ (B.M. 93.10.26.35)	Chiromo, Shire R.	54 + 18 mm.
	♂ (B.M. 33.4.3.4)	Lichenya Plateau.	50 + 14 mm.
	♀ (M.C.Z. 50749)	Ruo Gorge, Mlanje.	62 + 17 mm.

Records. Chiromo (as Tshiromo; G); Shire Highlands (G).

Native name of Flat-headed Short-tailed Chameleon. *Namandondo* (Nyanja).

Variation of the four known specimens; examined at the British Museum. Snout terminating in a small rostral process (scarcely distinguishable in type but flexible and longer in the other three

specimens where its length may be as much as 1 mm.); supraciliary ridge with a horn-like tubercle or process (not shown in figure of type); interorbital region with a non-angular transverse series of enlarged granules; vertebral line crenulated at regularly spaced intervals with the humps bearing granules scarcely larger than those in the intervening hollows; flanks covered with granules and scattered tubercles which are smaller than those of the race described below; a small pit beneath forearm and a less distinct one, a mere slit, in the groin anteriorly.

Size. As given above.

Breeding. On February 17 the Ruo Gorge ♀ held a single egg measuring 13 x 6 mm., she having doubtless just deposited the rest of the clutch.

Habitat. The Ruo Gorge ♀ was taken in thick forest close to the Power House at the lower end of the Gorge. For this choice reptile the Museum is indebted to J. F. Ramsden, Esq., manager of the Lujeri Estate. It will be noted that one ♂ is said to have come from the Lichenya Plateau which, if correct, appears to militate against the assumption of an upland and lowland race: the possibility that it was brought in by a native and taken on the way up or down from the plateau is worth investigating.

Brookesia platyceps carri subsp. nov.

Plate 3, figure 2; text-figure A

Type. A.M.N.H., No. 67823, a gravid female from Lichenya Plateau, 6000 feet, Mlanje Mountain, Nyasaland. Collected by Dr. L. J. Brass between June 24 and July 18, 1946.

Paratype. A.M.N.H., Nos. 72639, 72747, 72749, being three adult males from Ruo Gorge, between 3000 and 3500 feet, Mlanje Mountain, Nyasaland. Collected by Dr. A. F. Carr Jr., September 6, 1952. As might be expected, these paratypes are in the nature of intermediates but agreeing more nearly with the Plateau form.

Diagnosis. Differs from typical *platyceps* in the absence, or but indication of (at least in the ♂♂ and ♀ seen) a raised tubercle or hornlike process on the supraciliary ridge; also in the presence of much-enlarged, spine-like granules forming clumps along the crenulated vertebral line.

Description. Snout without trace of a flexible, terminal, rostral process (also absent in one of Carr's males, but present in the other

two males); supraciliary ridge without any horn-like process; interorbital region with a curved, non-angular, transverse series of enlarged granules; vertebral line crenulated at regularly spaced intervals with groups of enlarged (the centre one much-enlarged), more or less spine-like granules on the humps; flanks covered with granules and scattered tubercles larger than those of *p. platyceps;* a small pit beneath forearm and another in groin anteriorly.

Fig. A. Hemipenes of ♂ paratype (A.M.N.H. 72749).

Hemipenis. Two of the ♂ paratypes present everted hemipenes of a most peculiar appearance. Each consists of a thin-skinned, sac-like swelling from each of which arises a pair of well-separated, slightly compressed, recurved, claw- or horn-like organs along whose outer edge, flanking the sulcus, are a series of four papillae resembling soft spines.

Size. Total length of type ♀ (A.M.N.H. 67823), 75 (59 + 16) mm.; paratype ♂ (A.M.N.H. 72639), 86 (61 + 25) mm. The tail of the ♀ is included 4.68 times in the total length, those of the ♂♂ from 3.35 to 3.44 times.

Breeding. In late June or early July the ♀ type held 12 spherical ova of which the largest was only 4.5 mm. in diameter.

Habitat. Dr. Carr informs me that the three pygmy chameleons collected by him, were taken "in the transition zone between rain forest, with aroids and lianas, and a mist forest with *Podocarpus* and *Usnea*," as he ascended the Ruo Gorge trail from the Lujeri Estate power house to the Ruo Falls. He was informed that during the previous year the power house rain gauge had registered a fall of 177 inches. The three male chameleons were all found walking upon the leaf-strewn path. I understand that the type was accidentally found upon some botanical specimens that were being carried to camp by Dr. L. J. Brass.

SCINCIDAE

Mabuya quinquetaeniata obsti Werner

Mabouia quinquetaeniata Günther (not of Lichtenstein), 1893 (1892), p. 555; Johnston, 1897, p. 361.

Mabuia quinquetaeniata Boulenger, 1897e, p. 800; Johnston, 1898, p. 361.

Mabuia obsti Werner, 1913, Mitt. Nat. Mus. Hamburg, **30**, p. 43: Kwa Mtoro, Central Province, Tanganyika Territory.

Mabuia quinquetaeniata margaritifer Mitchell (not of Peters), 1946, p. 27.

1 (M.C.Z. 50751) Nchisi Mtn. 1.xii.48.
5 (M.C.Z. 50752–6) Chitala R. 14.xii.48.
1 (M.C.Z. 50757) Chowe. 12.ii.49.
3 (M.C.Z. 50758–60) Mtimbuka. 16.ii.49.
1 (M.C.Z. 50761) Chiradzulu Mtn. 27.viii.48.
12 (M.C.Z. 50762–73) Likabula R. 2–5.viii.48.
1 (M.C.Z. 50774) Ruo River. 1.iv.49.

Records. Nkata Bay to Ruarwe (B); Nyika district (B); Shire Highlands (G).

Native names of the Tanganyika Five-striped Skink. *Bulunzi wa nyala* (Chewa; Ngoni); *kiswakongono* (Nyanja); *kukumala* (Yao). Mitchell (1946, p. 43) gives *buluzi* as the Chewa and Nganja name for lizards in general.

Variation. One of the points that I hoped to elucidate during my

visit to Nyasaland was whether the form of *quinquetaeniata* occurring there might be *obsti* of Tanganyika (as I suspected) rather than the South African form (as had been reported). The number of midbody scale-rows clearly shows Nyasaland skinks belong to the equatorial form which has a higher count than have the races to the north and south. Thus:

Midbody scale-rows 40–44; range: Eastern Africa south of the Zambezi ..... *q. margaritifer*

Midbody scale-rows 44–48, rarely 42; range: Eastern Africa north of Zambezi ..... *q. obsti*

To ascertain if there were other supporting characters I made a detailed study of the variation displayed by the Nyasaland material for purposes of comparison with that shown by topotypic *margaritifer* (*vide infra*), but there seems to be nothing significant, apart from the southern form averaging slightly longer limbs.

Supranasals in contact behind the rostral; centre of nostril posterior to the vertical of the suture between rostral and first labial; postnasal not (23 ex.) or but rarely (1 ex.; M.C.Z. 50761) in contact with the second upper labial; anterior loreal in contact with the first and second (14 ex.), first, second and third (7 ex.), second only (2 ex.), or second and third (1 ex.) labials; supraoculars 4, first smallest, second largest; supraciliaries 5 (43 sides) or 6 (4 sides), usually first smallest, second largest; subocular not narrowed inferiorly, reaching the lip between the fourth (17 sides) or fifth (7 sides) labials; lower eyelid with a transparent disk that is smaller than the ear-opening, which has 4 (8 sides), 5 (14 sides), or 6 (1 or 2 sides) acuminate lobules projecting from its anterior border; frontonasal only in contact with the frontal in two specimens (M.C.Z. 50757; 50772); frontal in contact with the first, second and third (23 ex.) or second and third (1 ex.; M.C.Z. 50774) supraoculars only; frontoparietals smaller than, or subequal to, the interparietal, behind which the parietals are (22 ex.) or are not (1 ex.; M.C.Z. 50771) in contact; nuchals obtusely multicarinate posteriorly, rarely almost smooth.

Midbody scale-rows 42 (1 ex.; M.C.Z. 50751), 44 (3 ex.), 46 (10 ex.), or 48 (10 ex.), average for the 24 specimens 46.5 scale-rows; dorsals strongly tricarinate; preanals not (or but slightly in one or two ex.) enlarged; scales on soles not spinose, subdigital lamellae unicarinate; toes of the adpressed hind limb reach the wrist (5 ex.), elbow (15 ex.), or axilla (4 ex.) of the backward-pressed forelimb.

Color in life. The following notes of a non-breeding pair of this sexually dichromatic, yet strikingly beautiful, skink, were made at the Likabula River camp on August 2, 1948.

♂. Above, dark olive, head flecked with black and cream, eyelids edged with cream, lips greenish white, sharp pointed auricular lobules pale orange, the blunt lower one dusky; from occiput to tail a double series of cream-centred black spots, another widely separated, double series on either dorsolateral region; flanks paler than dorsum and turning to yellowish green below but handsomely spotted with very pale bluish, black-edged ocelli; limbs paler olive above, the anterior pair only displaying black-edged, pale blue spots; tail yellowish-orange with an elongated, wedge-shaped, dusky streak on the dorsal surface and a deeper orange band along either side. Below, throat creamy white changing to grayish flecked with white just below ear-opening; breast, belly, and underside of limbs white tinged with greenish towards the flanks; tail white suffused with orange.

♀. Above, bronze, paler on snout, lips greenish white, upper auricular lobules yellowish but ear-opening tinged with orange inferiorly; from occiput to base of tail is a yellowish, black-edged line with a similar one, commencing at the supraocular region, on either side; flanks paler brown sparsely flecked with black-edged, white ocelli; limbs gray with indistinct dusky markings except on the posterior side of the hind limbs where a white line connects with a similar one on the side of the tail; tail rich ultramarine blue, a wedge-shaped black mark on base of tail dorsally is continued as a dusky line or series of black spots to the tip, a similar black band on either side of tail. Below, throat creamy white; breast, belly, and underside of limbs faintly greenish white; basal quarter of tail white with a dusky line on either side, the remaining three-quarters pale ultramarine blue.

Size. Largest ♂ (M.C.Z. 50762), 282 (117 + 165) mm.; largest ♀ (M.C.Z. 50764), 266 (114 + 152) mm. In size, therefore, there is no appreciable sexual difference other than the more robust habit of the males.

Breeding. Between August 2–5 one ♀ examined, held round ova 9 mm. in diameter.

Diet. In stomach of one a large wasp. Mr. B. L. Mitchell tells me that by baiting petrol cans with rotten fruit (which presumably attracted insects) he captured (May to November, 1944) examples of these skinks from two small colonies on rocky outcrops of the southern cliffs on Zomba Plateau, where I failed to see any during the eleven

days (September 1–13) I spent there in rather cool weather.

Habitat. On rocks above Nchisi boma; on rocks along river bed at Chitala; on rocks above house at Chowe; on rocks of the eastern spur of Chiradzulu; on rocks beside river at Likabula; on cement base of power house in the Ruo Valley.

Mabuya quinquetaeniata margaritifer (Peters)

Euprepes margaritifer Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 618: Tete, Mozambique.
Euprepes savignyi Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 618: Tete, Mozambique.
Euprepis gularis Gray, 1864, Proc. Zool. Soc. London, p. 61: Southeast Africa.
Euprepis kirkii Gray, 1864, Proc. Zool. Soc. London, p. 62: Tete, Mozambique.

27 (M.C.Z. 50775–801) near Tete. 6–28.i.49.

Native names of Southern Five-striped Skink. *Mbuuyu fife* (♂), *mbuuyu burumu* (♀) (Nyungwe).

Variation. Supranasals in contact behind the rostral; centre of nostril posterior to the vertical of the suture between rostral and first labial; postnasal not (26 ex.) or barely (1 ex.; M.C.Z. 50785) in contact with the second upper labial; anterior loreal in contact with the first and second (8 ex.), first, second and third (18 ex.), or second and third (1 ex.) labials; supraoculars 4, first smallest, second largest; supraciliaries 5 (49 sides) or 6 (5 sides), usually first smallest, second largest; subocular not narrowed inferiorly, reaching the lip between the fourth and fifth (17 ex.) or fifth and sixth (10 ex.) labials; lower eyelid with a transparent disk that is smaller than the ear-opening, which has 4 (1 side; M.C.Z. 50796), 5 (14 sides), or 6 (12 sides) acuminate lobules projecting from its anterior border; frontonasal not in contact with the frontal; frontal in contact with the first and second (3 sides) or first, second and third (51 sides) supraoculars; frontoparietals smaller or subequal to the interparietal, behind which the parietals are in contact (27 ex.); nuchals obtusely multicarinate posteriorly, rarely almost smooth.

Midbody scale-rows 40 (7 ex.), 42 (10 ex.), or 44 (10 ex.), average for the 27 specimens 42.2 scale-rows; dorsals strongly tricarinate; preanals not enlarged; scales on soles not spinose; subdigital lamellae unicarinate; toes of the adpressed hind limb reach the wrist (2 ex.), elbow (12 ex.), axilla (10 ex.), or shoulder (3 ex.) of the backward-pressed forelimb.

Size. Largest ♂ (M.C.Z. 50775), 283 (100 + 183) mm.; largest ♀ (M.C.Z. 50786), 257 (104 + 153) mm. Surpassed in head-and-body length by a ♂ of 111 mm., a ♀ of 105 mm. so in size there is little difference between these topotypical *margaritifer* and Nyasaland *obsti*.

Habitat. The eroded rocky hills around Tete provide ideal conditions for this rupicolous skink which is consequently abundant. Most of my specimens came from rocks along the south bank of the Zambezi three or four miles west of Tete township. It is not often that one can collect three, possibly four, topotypes at one and the same time, as was the case here, in part due to the striking sexual dichromatism.

Mabuya maculilabris comorensis (Peters)

Euprepes comorensis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 619: Anjuan, *i.e.* Johanna Island, Comoro Islands.

♂ (M.C.Z. 50750) Ruo River. 1.iv.49.

Records. New to Nyasaland, but Mr. B. L. Mitchell informs me (27.viii.48) that he has taken *maculilabris* at Chikwawa and Chiromo on the Shire River. Possibly his specimens are referable to this race; see remarks under *M. m. boulengeri* below.

Variation. Supraciliaries 6–7; midbody scale-rows 34; dorsals septem- or novemcarinate.

Color. Below, throat white streaked with brown; chest and belly to anus bright yellow. Testes large.

Size. Total length of ♂, 184 (77 + 107) mm.

Diet. Grasshoppers in stomach.

Habitat. One of a pair living beneath crossplanks on the 'suspension' bridge (since removed) straddling the well-forested Ruo Gorge near Lujeri Estate.

Mabuya maculilabris boulengeri Sternfeld

Mabuia boulengeri Sternfeld, 1911, Sitzb. Ges. Naturf. Freunde Berlin, p. 248: Makonde Plateau, Lindi Province, Tanganyika Territory.

♂ (M.C.Z. 50700) Mtimbuka. 22.ii.49.

Records. New to Nyasaland. This form differs from *m. comorensis* in possessing a consistently lower number of supraciliaries and midbody scale-rows, besides having a more slender body, relatively longer tail, and duller coloring.

Variation. Supraciliaries 4–4; midbody scale-rows 30; dorsals septemcarinate.

Size. Total length of ♂, 199 (74 + 125) mm.

Diet. A single large spider in stomach.

Habitat. Observing a slight twitching of a few leaves, that formed part of a mass of creepers smothering a bush or tree, I covered the spot, which was twelve feet from the ground, with my .22 collecting gun, simultaneously instructing my gunbearer to gently shake one of the lianas. As he ceased to shake, a lizard's head appeared among the foliage; I fired and down fell this fine specimen with a dust shot through the neck. I have the impression that this race is rather more addicted to arboreal habits than is *comorensis*, with both of which I have had experience in Tanganyika.

Mabuya lacertiformis (Peters)

Euprepes lacertiformis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 618: Boror, Mozambique.

1 (M.C.Z. 50802) near Mtimbuka. 16.ii.49.
1 (M.C.Z. 50803) near Mpatamanga Gorge. 31.i.49.
29 (M.C.Z. 50804–13) Kasumbadedza, M. 6–22.i.49.

Records. These constitute the first records of the occurrence of this distinctive skink in Nyasaland. Indeed, since the original description appeared a century ago, the only fresh material collected were nine specimens taken at Beira and Caia by Cott (1934a, p. 166).

Native name of the Lizard-like Skink. *Nshela* (Nyungwe).

Variation. Supranasals in contact behind the rostral; centre of nostril *anterior* to (29) or above (2) the vertical of the suture between rostral and first labial; postnasal not in contact (24) or in contact (7) with the second labial; loreal in contact with the first and second (24), second only (4), or the second and third (3) labials; supraoculars 4–4, first smallest, second largest; supraciliaries 4 (7 sides), 5 (48 sides), or 6 (4 sides); subocular narrowed inferiorly, reaching the lip between the fourth and fifth (2), fifth and sixth (26), or sixth and seventh (1) labials; lower eyelid with a transparent disk that is larger than the ear-opening, which has 3 (26) or 4 (5) more or less acuminate lobules projecting from its anterior border; frontonasal in contact with the frontal (29); frontal in contact with the first, second and third (15 sides), or second and third (47 sides) supraoculars; frontoparietals subequal to, or smaller or larger than, the interparietal, behind which

the parietals meet (29), though sometimes barely; nuchals, when not broken up (1), entirely multicarinate (28).

Midbody scale-rows 36 (13), 37 (2), 38 (13), or 40 (3); dorsals very strongly tricarinate or quinquecarinate, when five the laterals are less developed than the three main keels; preanals not, or but slightly, rarely distinctly, enlarged; scales on soles *strongly spinose;* subdigital lamellae unicarinate and serrate; toes of the adpressed hind limb reach the wrist (2), elbow (9), axilla (11), or shoulder (9) of the backward-pressed forelimb.

Size. Largest ♂ (M.C.Z. 50807), 131 (48 + 83) mm., largest ♀ (M.C.Z. 50805), 120 (52 + 68) mm.; the smallest (M.C.Z. 50803), 67 (26 + 41) mm.

Breeding. On January 6, a ♀ held eggs measuring 8.5 x 6 mm. Many others of the series are obviously gravid but have not been examined as it would involve damage to the unusually delicate skin.

Enemies. A freshly-swallowed tail was recovered from the stomach of a Stripe-bellied Sand-Snake (*Psammophis s. subtaeniatus*); the lizard had escaped.

Habitat. Though during the dry season (100° daily at Kasumbadedza) these rupicolous lizards were abroad in the early morning, they appeared to be more active towards sunset when hunting for their insect prey among the drifts of dried leaves that accumulate along the base of the shelving rocks or rounded boulders. This habitat they share with *Mabuya q. margaritifer* but are likely to be overlooked owing to their cryptic coloring and quiet movements. The Mtimbuka skink actually came from the summit of the rocky hill behind Dr. Fitzmaurice's house on the lakeshore about twenty-five miles north of Fort Johnston. The Mpatamanga specimen inhabited the same group of rocks as the new species of *Platysaurus*. All had to be shot as there was no other way of obtaining them.

Mabuya striata ellenbergeri Chabanaud

Mabuia ellenbergeri Chabanaud, 1917e, Bull. Mus. Hist. nat. Paris, **23**, p. 219, figs. 1–2: Lealui, Upper Zambezi, Northern Rhodesia.

49 (M.C.Z. 50701–42) near Tete. 5–16.i.49.

Range and Status. In literature previously known only from the extremely young holotype with which some of my specimens have been compared through the courtesy of Mons. Jean Guibé of the Paris

Museum. The type came from a point about 650 miles due east of Tete, or over 800 miles up the Zambezi. This gap is bridged by an example (M.C.Z. 21652) from the Victoria Falls and a second (M.C.Z. 29210) from Livingstone, Northern Rhodesia, four miles north of the Falls. It would appear to have reached the vicinity of Tete since Wilhelm Peters made his extensive collections there in 1844–5, for he failed to secure any specimens though it is now so abundant that I obtained 23 with 26 shots on the morning of January 8.

Though *Mabuya striata* is the commonest lizard in East Africa, these Tete skinks were so strikingly different in coloration that the idea of them being referable to *striata* never entered my head until I made a study of their lepidosis in the laboratory. Distinctive though the entire Tete series is in appearance, it is clearly only a race of *striata* for intergrades in color pattern between it and typical *striata* (M.C.Z. 51342–6) occur at the Victoria Falls, and between it and those *striata* in which the subocular fails to reach the lip at both the Falls (M.C.Z. 51347–9) and at Livingstone (M.C.Z. 29211–2). It apparently corresponds to the color form C described by FitzSimons (1935b, p. 372) as characteristic of "practically all the specimens from west and north of Kaotwe."

M. s. ellenbergeri appears to be closely related to *M. binotata* from which it can be distinguished by:

Scales on soles sharply spinose; subdigital lamellae strongly unicarinate ..... *s. ellenbergeri*

Scales on soles smoothly tubercular (inclined to be bluntly spinose in young according to FitzSimons); subdigital lamellae smooth or feebly unicarinate ..... *binotata*

Native name. *Mbunyu* (Nyungwe, but also applied to *M. q. margaritifer*).

Variation. Based on the entire series; unless damaged, both sides of each individual were examined except in the case of labial characters when sometimes the right side only was deemed sufficient.

Supranasals in contact behind the rostral; centre of nostril posterior to the vertical of the suture between rostral and first labial; postnasal not in contact with the second upper labial; anterior loreal in contact with the first, second, and third upper labials (31 ex.), or second and third only (18 ex.); supraoculars 4 (3, through fusion of first and second, on left side of M.C.Z. 50719; possibly 5 on both sides of M.C.Z. 50722), first smallest, second largest; supraciliaries 4 (6 sides),

5 (82 sides), or 6 (9 sides), usually first smallest, second largest; subocular much narrowed inferiorly (except in M.C.Z. 50717 where it rests upon the fifth and sixth labials so fails to reach the lip) reaching the lip between the fourth and fifth (M.C.Z. 50740 only), the fifth and sixth (22 ex.), or sixth and seventh (25 ex.) labials; lower eyelid with a transparent disk that is subequal to, or larger than, the ear-opening, which is vertically oval without (M.C.Z. 50728 only), or with 1 (3 ex.), 2 (5 ex.), 3 (31 ex.), 4 (8 ex.), or even 5 (left side only of M.C.Z. 50717) more or less acuminate lobules projecting from its anterior border; frontonasal in contact with (37 ex.) or separated from (12 ex.) the frontal; frontal in contact with the first, second, and third (10 sides), or only second and third (88 sides) supraoculars; frontoparietals smaller or subequal to the interparietal, behind which the parietals are (30 ex.), or are not (16 ex.) in contact; nuchals (rarely not developed) obtusely multicarinate posteriorly.

Midbody scale-rows 34 (5 ex. as in the type also), 35 (1 ex.), 36 (21 ex.), 37 (5 ex.), 38 (17 ex.) or, astonishingly enough, 42 (in M.C.Z. 50737 only), this figure having been checked and rechecked, average for the 49 specimens 37.4 scale-rows; dorsals strongly tricarinate with or without an outer pair of keels represented by a mere raised dot (27 ex.), or more or less strongly quinquecarinate (22 ex.), these latter usually being the biggest skinks; preanals not (or but slightly in one male) enlarged; scales on soles strongly spinose; subdigital lamellae sharply unicarinate and spinose; toes of the adpressed hind limb reach the fingers (3 ex.), wrist (22 ex.), elbow (27 ex.), or axilla (3 ex. all under 71 mm. from snout to anus) of the backward pressed forelimb.

Color in life. Above, head from snout to nape orange brown, from the loreal region to above the forearm is a conspicuous, broad, black band that tends to fade out on flank but may continue to the hind limb; back brown with a slightly paler dorsolateral stripe, about two scales in width, extending on to the base of the tail which otherwise is uniformly pale brown. Below, both upper and lower lips and throat, lemon yellow; body and tail white.

Size. Largest ♂ (M.C.Z. 50706), 257 (93 + 164) mm.; largest ♀ (M.C.Z. 50717), 222 (90 + 132) mm.; the type was only 108 (67 + 41) mm.

Breeding. Many, possibly all, the females are gravid in January; one held 6 eggs measuring about 11 x 8 mm., but in others there are embryos.

Diet. The much-chewed remains of beetles, representing three

families, a cockroach and its egg-purse, recovered from one of these lizards, were recognized by my colleague Dr. P. J. Darlington.

Enemies. One lizard was recovered from the stomach of a Stripe-bellied Sand-Snake (*Psammophis s. subtaeniatus*).

Habitat. In the early morning one or two of these skinks might be seen basking on the trunk of almost every mopane tree. These exclusively arboreal lizards proved exceedingly wary, rarely permitting a person to approach nearer than twenty feet from them before slipping into the cavity provided by most mopane trees, with whose distribution possibly their own is linked.

Mabuya striata striata (Peters)

Tropidolepisma striatum Peters, 1844, Ber. Akad. Wiss. Berlin, p. 36: Mozambique.

Mabuia striata Boulenger, 1897e, p. 800; Johnston, 1898, p. 361; Mitchell, 1946, p. 27.

2 (A.M.N.H. 67833–4) Kasungu. 18–23.viii.46.
1 (A.M.N.H. 67824) Lichenya Plateau. vi–vii.46.
6 (M.C.Z. 50864–8) Misuku Mtns. 29–30.ix.48.
3 (M.C.Z. 50869) Nchenachena. 20.xi.48.
3 (M.C.Z. 50870–2) Chitala River. 14.xii.48.
2 (M.C.Z. 50873–4) Mtimbuka. 10.ii.49.
1 (M.C.Z. 50875) Zomba Plateau. 1.ix.48.

Records. Chikwawa (M. ms.); Chiromo (M. ms.); Fort Hill (B); Fort Johnston (M. ms.); Karonga to Kondowe (B); Limbe (M. ms.); Monkey Bay (M. ms.); Nkata Bay to Ruarwe (B); Nyika District (B); Nyika Plateau (B); Port Herald (M. ms.).

No effort was made to collect this common Two-striped Skink which was seen at Blantyre (31.xii.48); Chinunkha (18.x.48); Cholo Mtn. (17.iii.49); Kausi Village (25.ii.49); Lichenya Plateau (6.viii.48); and Nchisi Mtn. (27.xi.48). Though I was constantly on the lookout for this form during the month spent near Tete, none was seen there.

Native names of the Two-striped Skink. *Mbulundwe* (Yao, but generic); *mbululnzi* (Chewa; Ngoni); *shioloe* (Misuku, but generic).

Variation. Frontonasal in contact with the frontal (in 15) or separated by the prefrontals (in 3); lobules on anterior border of the ear 0–5, but normally 3; midbody scale-rows 36–40, the highest number on a duplicate Nchenachena specimen only.

Noting that of the 9 most northerly specimens 7 were of the

primitive form in which the subocular rests upon the labials, and of the 9 southern examples 7 were typical *striata* with the subocular reaching the lip between two labials, I made an intensive study of the more than 200 "*striata*" (from 85 localities) in the Museum's collection in an effort to determine whether the distribution of the two forms was such as to justify the recognition of a race — for which a name is available.

Plotting the records on a map of Africa revealed that the primitive form apparently came down the rift valley, being dominant about Lakes Victoria, Kivu, Tanganyika and the north end of Nyasa. South of that point the situation is confused and our material scanty, but the published data of Dr. V. FitzSimon's huge series seems to lend little support to separation. Typical *striata* is dominant on the coastal plains of Kenya and Tanganyika to Mozambique Island — type locality of *striata*. South of that I have no coastal material except five specimens from Lourenço Marques and Umvoti River Mouth, all of which are the primitive, *not* the typical form!

Irrespective of this sublabial character it was observed that the majority of skinks from localities north of the Central Railway of Tanganyika tended to have the centre of the nostril directly above the vertical of the suture of rostral and first labial, while in those from south of the Central Railway it tended to be behind. The character is a somewhat nebulous one for it is frequently difficult to decide to which category an individual skink should be assigned. The distribution of a species that is so intimately connected with man, must have been affected to a considerable degree by human migration.

Parasites. The deep armpits of one Misuku skink were filled with bright red mites.

Habitat. Another Misuku skink lived in a mouse hole flanking the path near our camp at 6000 feet and remote from any human habitation. On the day of our arrival on Lichenya Plateau, also 6000 feet, I counted five of these skinks basking on the mud wall of one of the foresters' huts which I feel confident they had reached through human agency as they were not seen elsewhere during our stay on the plateau. At Chitala River one was found in a gasoline-can bat-trap set up beneath the eaves of the office. Most frequently they were seen on walls or in the vicinity of villages, less frequently on hollow trees.

MABUYA BOCAGII MLANJENSIS subsp. nov.

Type. M.C.Z. No. 50692, an adult male from Lichenya Plateau, 6000 feet, Mlanje Mountain, Nyasaland. Collected by Arthur Loveridge, August 9, 1948.

Paratypes. M.C.Z. Nos. 50693–9, both males and females with the same data as the type but taken August 9–24, 1948.

Diagnosis. From inadequately-known *bocagii* of Angola, with a Congulu specimen of which I have been able to compare it through the courtesy of Dr. H. W. Parker, the differences are minor and may prove of average importance only. *M. b. mlanjensis* differs from *b. bocagii* in the centre of the nostril *not* being anterior to the vertical of the suture between the rostral and first labial, in its anterior loreal *usually not* being in contact with the first labial, and in the probability that the number of its midbody scale-rows (36–38) average lower than those of *bocagii* (36–40) which are so frequently 40; the limbs of *mlanjensis* apparently tend to be shorter than those of Angolan *bocagii*. In *mlanjensis* the vertebral line, when present, is noticeably narrower than in the Congulu *bocagii*.

From *v. varia*, which is the common skink on Mlanje, *b. mlanjensis* may be distinguished by the absence of a white lateral line, and the presence of more numerous (36–38, instead of 30–34) scales around midbody, besides larger size. In addition there are average differences such as the number of labials anterior to the subocular (5–6 in *mlanjensis*, 4–5 in *varia*). The discovery of this montane form makes it probable that *M. brauni* Tornier, from the Ukinga Mountains at the north end of Lake Nyasa and about 500 miles north of Mlanje, is not a race of *varia* as I once (1933h, pp. 317–318) suggested, but a race of *bocagii* Boulenger, of which *mlanjensis* is the southeastern representative.

Description. Supranasals in contact behind the rostral; centre of nostril slightly posterior to (type and 6 paratypes), or directly above (2) the vertical of the suture between rostral and first labial; postnasal not in contact with the second upper labial; anterior loreal in contact with the first and second (type and 5), first, second and third (1), or only second (1) labial; supraoculars 4, first smallest, second largest; supraciliaries 5 (type and 11 sides), or 6 (3 sides), first usually smallest, second largest; subocular strongly narrowed inferiorly, *reaching the lip* between the fifth and sixth (type and 6), or sixth and seventh (1) labials; lower eyelid with a transparent disk that is subequal to, or

larger than, the ear-opening, which has 1 (2 sides), 2 (type and 5 sides), or 3 (7 sides) more or less acuminate lobules projecting from its anterior border; frontonasal in contact with (7), or separated from (type and M.C.Z. 50696) the frontal; frontal in contact with the first, second and third (type), or second and third (13 sides) supraoculars; frontoparietals smaller than, or subequal to, the interparietal, behind which the parietals meet (in all); nuchals, when not broken up (2), sharply (type) or obtusely multicarinate.

Midbody scale-rows 36 (type and M.C.Z. 50695) or 38 (6); dorsals all strongly tricarinate; preanals not enlarged; scales on soles strongly spinose; subdigital lamellae unicarinate and serrate; toes of the adpressed hind limb barely meet (M.C.Z. 50695), or overlap the fingers (type and 4), or reach the wrist (2) of the backward pressed forelimb.

Color. Essentially similar to that of *M. hildae* described below. Type ♂ following preservation in formalin. Above, bronzy to blackish brown flecked with lighter; three pale buff longitudinal lines of which the vertebral originates on the nuchals as four slender lines that converge at a point about level with the forelimbs, the dorsolateral lines arise in the supraocular region and continue on to the tail where they merge with the vertebral to form a single line; upper and lower labials white (dark in most paratypes), the white being continued very faintly as a line that crosses the ear-opening and reaches the forelimb. Below, centre of throat white edged with gray, the latter predominating on all undersurfaces (in some paratypes the median line of the belly is more or less whitish).

In life, one ♂ (12.viii) had an orange spot on each gular scale for fourteen rows behind the mental; a gravid ♀ (9.viii) had orange spots on her throat; sometimes the tails of the males exhibit a rosy glow.

Size. Total length of type ♂ (M.C.Z. 50692), 136 (60 + 76) mm. but tail regenerated; length of paratype ♀ (M.C.Z. 50695), 170 (72 + 98) mm., her head and body length being equalled by a ♂ paratype with regenerated tail.

Breeding. On August 12, at 1 P.M., I observed a pair in coitu on a large stone, the ♀ encircled in a coil of the male's body; his tail was pinkish. On August 24, at 11 A.M. in bright sunshine, I saw one skink chase another and just as she reached some rocks, seize her by the tail, whereupon pairing took place immediately. On August 10 a gravid ♀ held tiny embryos with pigmented eyes.

Parasites. Mites are occasionally present in the armpit, but a deep pocket is rarely present.

Enemies. One recovered from the stomach of a snake (*Psammophylax t. variabilis*).

Habitat. If disturbed when sunning on the burnt-over grasslands these skinks dart under the roots of the nearest clump of everlasting flowers, then if that clump was pulled up the reptile would make a rush for the next. They also frequented rocks beneath which they could seek refuge. When I shot one on a boulder and it rolled off, two other skinks I had failed to see dashed at it, "fighting it" said my gunbearer who was standing six feet from them.

Mabuya hildae sp. nov.

Type. M.C.Z. No. 50684, an adult female from the Nyika Plateau above Nchenachena, at 7000 feet, northwest of Lake Nyasa, Nyasaland. Collected by Arthur Loveridge, November 17, 1948.

Paratypes. M.C.Z. Nos. 50685–91 and an uncatalogued juvenile, being four ♂♂, two ♀♀, and two juveniles, from the same general region as the type but at altitudes ranging from 7000 to 8000 feet. Collected by Miss Hilda Sloan, who secured the first specimen, and Arthur Loveridge between November 11 and 17, 1948.

Diagnosis. Subocular resting on the labials, a primitive character that distinguishes *hildae* from all other members of the genus in Nyasaland except a variant of *striata*. Midbody scale-rows 38–40, the dorsals strongly bicarinate or tricarinate in the young but tricarinate in adults, sometimes obtusely. Most closely related to the Mlanje species described below, and possibly to *brauni* Tornier of the Ukinga Mountains at the northern end of Lake Nyasa, Tanganyika Territory.

From *M. varia* and its race occurring on the Nyika, *hildae* is most readily recognized by having no white lateral line, and, besides the subocular and other characters, by having more numerous supraciliaries and more scales around midbody.

Description. Supranasals in contact behind the rostral; centre of nostril posterior to (in type and 6 paratypes), or directly above (2) the vertical of the suture between rostral and first labial; postnasal not (type and 6), or barely (2), in contact with the second upper labial; anterior loreal in contact with the first and second (type and 5), first, second and third (1), second only (1), or second and third (1) labials; supraoculars 4, first smallest, second largest; supraciliaries 5, first usually smallest, second largest; subocular scarcely narrowed inferiorly, *not reaching the lip*, resting on the fifth and sixth (M.C.Z.

50691), sixth (type and 3), sixth and seventh (3), or seventh (1) labial (M.C.Z. 50688); lower eyelid with a transparent disk that is subequal to, or larger than, the ear-opening, which has 2 (type and 8 sides) or 3 (8 sides) more or less acuminate lobules projecting from its anterior border; frontonasal in contact with (type and 6) or separated from (2) the frontal; frontal in contact with the first, second and third (2) or second and third (type and 6) supraoculars; frontoparietals smaller than the interparietal, behind which the parietals are separated (type and 6) or meet (2); nuchals posteriorly multicarinate or smooth.

Midbody scale-rows 38 (2 paratypes) or 40 (type and 6); dorsals strongly bicarinate or tricarinate in young, tricarinate in (type) adults, sometimes obtusely; preanals not or but slightly enlarged; scales on soles strongly spinose; subdigital lamellae unicarinate and serrate; toes of the adpressed hind limb fail to meet (type and M.C.Z. 50685) in largest specimens, or overlap the fingers (4), wrist (1), or elbow (1) of the backward pressed forelimb.

Color. Type ♀ following preservation in formalin. Above, black, a pale, faintly indicated, dorsolateral line arises in the supraocular region and extends backwards towards the hind limb. Below, uniformly plumbeous with some black flecking in middle of abdomen and a whitish circumanal area.

♂ adult (M.C.Z. 50686) as recorded in life. Above, head pale brown, the supraoculars and parietals mottled with black; subocular and both upper and lower labials uniformly cream colored; back and flanks black longitudinally flecked with pale brown, each spot with a more or less light center; a pale brown vertebral stripe commences in the scapula region and extends backwards on to the tail; a cream-colored dorsolateral stripe begins on the supraocular and terminates on base of tail; flanks with irregular cream-colored flecks in more or less longitudinal series; tail (missing). Below, pure grayish white, lower jaws and throat anteriorly flecked with black; chest, centre of belly, and circumanal region with faint traces of salmon-pink.

In all the young and smaller adults the black flecking on the gular region is very conspicuous.

Size. Total length of type ♀ (M.C.Z. 50684), 150 (87 + 63) mm., but tail regenerated; length of paratype ♂ (M.C.Z. 50687), 121 (50 + 71) mm., but surpassed in head and body length by one (M.C.Z. 50686) of 64 mm.

Breeding. In both females examined the ova are small.

Enemies. One, too damaged to catalogue, was recovered from the

stomach of a Harrier (*Circus macrourus*).

Habitat. The largest, but tailless, male, first of the series to be taken, was captured near the summit of a rock-strewn mountain by Miss H. L. Sloan. As all the lizards caught previously were *varia*, I had assumed it was the only skink present. Stimulated by this find I kept a constant lookout for the new skink. On November 16, following two and a quarter days of mist and rainstorms, I found one basking at noon beside the main Kaulime path about four miles west of camp. At 2.30 P.M. the same day another young one was basking outside my tent. At 11 A.M. the following day the type was seen resting on the excavated soil at the entrance of a rodent burrow, down which it dashed, and from which we dug it. The burrow was on an open mountainside.

Mabuya varia nyikae subsp. nov.

Type. M.C.Z. No. 50860, an adult female from the Nyika Plateau above Nchenachena, at 7000 feet, northwest of Lake Nyasa, Nyasaland. Collected by Arthur Loveridge, November 1, 1948.

Paratypes. M.C.Z. Nos. 50861–3 and two uncatalogued, being four ♂♂ and one ♀ with similar data to the type but taken between November 1 and 8, 1948.

Diagnosis. This montane form differs from typical *varia*, of which topotypes (alt. 250 feet) and abundant material is available for comparison, in the centre of *nyikae's* nostril being directly above the vertical of the rostral-labial suture in five of the six specimens; reduction in supraciliaries; increase in scale-rows which are 34–36 (whereas 150 *varia* taken between sea-level and 6000 feet have 30–34); shorter limbs, for the toes of the adpressed hind limb fail to meet the backward-pressed forelimb in both females and only meet the fingers in the males; more slender habitus; and darker coloration, especially on chin and throat which are plumbeous in all but one of the *nyikae* series.

Description. Supranasals in contact behind the rostral; centre of nostril directly above (type and 4), or slightly posterior to (1), the vertical of the suture between rostral and first labial; postnasal not in contact with the second upper labial; anterior loreal in contact with the first and second labials; supraoculars 4, first smallest, second largest; supraciliaries 3 (1 side), 4 (9 sides, one of which is type), or 5 (2 sides, one of which is type), first usually smallest, second largest;

subocular slightly narrowed inferiorly, reaching the lip between the fourth and fifth (type and 4) or fifth and sixth (1) labials; lower eyelid with a transparent disk that is subequal to, or larger than, the ear-opening, which has 2 (type and 2), or 3 (2), rarely not discernible (1), more or less acuminate lobules projecting from its anterior border; frontonasal in contact with the frontal; frontal in contact with the second and third supraoculars; frontoparietals subequal to, or smaller than, the interparietal, behind which the parietals meet; nuchals multicarinate, sometimes only posteriorly.

Midbody scale-rows 34 (3) or 36 (type and 2); dorsals strongly tricarinate; preanals not or but slightly enlarged; scales on soles strongly spinose; subdigital lamellae unicarinate and serrate; toes of the adpressed hind limb fail to meet (type and other ♀), or overlap the fingers (4 ♂♂) of the backward pressed forelimb.

Color. Above, blackish brown (instead of the reddish brown of typical *varia*) with the usual pattern and markings. Below, chin and throat plumbeous (except in one paratype); breast, belly and tail more or less gray (except in one paratype).

Size. Total length of type ♀ (M.C.Z. 50860), 127 (55 + 72) mm., of paratype ♂ (M.C.Z. 50861), 123 (48 + 75) mm.

Breeding. On November 1 the type held small, but developing ova; on November 8 a paratype ♀ held ova measuring 8 x 6 mm.

Parasites. No mites present beneath forelimbs whose axillary pits are not developed.

Enemies. The undigested tail of a skink was recovered from the stomach of a snake (*Psammophylax t. variabilis*), evidence of the advantage afforded the lizard by a readily discarded caudal appendage.

Habitat. The type was taken near the top of Nchenachena Falls, another was removed from a mouse hole down which it had been seen to retire. It was secretiveness, rather than scarcity, that resulted in my securing so small a series. When the sun offered sufficient inducement, these solitary skinks would emerge to bask at the entrance of the rodent burrows that were scattered over the rolling grasslands. It needed sharp eyes to detect them at a distance for, at the approach of danger, they would turn back into their retreat from which it was usually a lengthy business to dig them out.

Mabuya varia varia (Peters)

Euprepes (*Euprepis*) *varius* Peters, 1867, Monatsb. Akad. Wiss. Berlin, p. 20: Tete, Mozambique.

Mabouia varia Günther, 1893 (1892), p. 555; Johnston, 1897, p. 361.
Mabuia varia Boulenger (part), 1897e, p. 800; Johnston, 1898, p. 361; Mitchell, 1946, p. 27.

1 (A.M.N.H. 67839) Zomba Plateau. v.–vi.46.
1 (A.M.N.H. 67811) Likabula River. vi–vii.46.
4 (M.C.Z. 50814–6) Misuku Mtns. 27–30.ix.48.
3 (M.C.Z. 50817–9) Nchisi Mtn. 30.xi.48.
1 (M.C.Z. 50820) Chitala River. 14.xii.48.
1 (M.C.Z. 50825) Mtimbuka. 10.ii.49.
1 (M.C.Z. 50826) Chowe. 12.ii.49.
7 (M.C.Z. 50821–4) Zomba Plateau. 2–7.ix.48.
1 (M.C.Z. 50827) Chiradzulu Mtn. 31.viii.48.
6 (M.C.Z. 50828–34) Cholo Mtn. 11–18.iii.49.
9 (M.C.Z. 50835–43) Likabula R. 2–5.viii.48.
12 (M.C.Z. 50844–53) Lichenya Plateau. 8–20.viii.48.
2 (M.C.Z. 50854–5) Ruo River. 1.iv.49.
11 (M.C.Z. 50856–9) near Tete, M. 10–28.i.49.
1 (M.C.Z. 50300) Beira, M. 17.vii.48.

Records. Blantyre (M.ms.); Chikwawa (M.ms.); Chiromo (M.ms.); Fort Johnston (M. ms.); Karonga to Kondowe (B); Limbe (M.ms.); Misuku (as Masuku) Mtns. (B); Mlanje Mtn. (M.ms.); Monkey Bay (M.ms.); Nkata Bay to Ruarwe (B); Nyika district (B); Port Herald (M.ms.); Shire Highlands (G); Zomba (M).

Native names of the Tete Variable Skink. *Mbulundwe* (Yao, but generic); *mbulunzi* (Chewa; Ngoni); *mpumapuma* (Nyungwe); *nalikwampwilo* (Nyanja); *shioloe* (Misuku, but generic).

Remarks. In the following summary of variation, specimens from Lichenya Plateau at 6,000 feet, though darker, do not appear to differ in lepidosis from the rest of the series taken at lower altitudes.

Variation. Supranasals in contact (56 specimens), or separated (4), behind the rostral; centre of nostril posterior to (60) the vertical of the suture between rostral and first labial; postnasal not (60) in contact with the second upper labial; anterior loreal in contact with the first and second (38), first, second and third (18), or second and third (3) labials; supraoculars 4, first smallest, second largest; supraciliaries 4 (18 sides) or 5 (80 sides), first usually smallest, second largest; subocular slightly narrowed inferiorly, reaching the lip between the fourth and fifth (42) or fifth and sixth (19) labials; lower eyelid with a transparent disk that is subequal to, or larger than, the ear-opening, which has 2 (30), 3 (26), 4 (M.C.Z. 50814 only), or none (4), dis-

cernible more or less acuminate lobules projecting from its anterior border; frontonasal in contact with (50), or separated from (9, in three instances by an azygous scale split off from) the frontal; frontal in contact with the first, second and third (15 sides), or second and third (105 sides) supraoculars; frontoparietals subequal to, or smaller or larger than, the interparietal, behind which the parietals meet (55) or are separated (M.C.Z. 50859 and three Lichenya Plateau skinks); nuchals, when not broken up, sharply or obtusely multicarinate, occasionally smooth.

Midbody scale-rows 30 (7), 32 (16), or 34 (38); dorsals strongly tricarinate; preanals not or but slightly, rarely distinctly, enlarged; scales on soles strongly spinose; subdigital lamellae unicarinate and serrate; toes of the adpressed hind limb just meet (5), or overlap the fingers (14), wrist (12), elbow (21), or reach the axilla of the backward-pressed forelimb.

Size. Largest Nyasaland ♂ (M.C.Z. 50830), 150 (55 + 95) mm.; ♀ (M.C.Z. 50815), 168 (70 + 98) mm.; largest Mozambique ♂ (Duplicate) 131+ (53 + 78+) mm. but tail regenerated; ♀ (M.C.Z. 50856), 178 (65 + 113) mm.

Breeding. Between August 2–5, at Likabula, 3 ♀ ♀ held large ova, a fourth well-scaled embryos; between August 8–20, on Lichenya, 4 ♀ ♀ held small ova, the largest 4 mm. in diameter; between September 2–7, on Zomba, 5 ♀ ♀ held developing ova; on September 27, in the Misukus, 2 ♀ ♀ held well-developed embryos numbering 8 and 14 respectively; on November 30, Nchisi Mtn., 2 ♀ ♀ held 7 mm. diameter ova in which unpigmented embryos were recognizable; between January 10–28, near Tete, 4 ♀ ♀ held small ova, the largest 4 mm. in diameter; between March 11–18, on Cholo, of 4 ♀ ♀ examined 2 held *very* small ova (? spent), 1 large ova, and the fourth gave birth to a young one (M.C.Z. 50828) measuring 49 (21 + 28) mm. in the field.

Diet. Two 20 mm.-long, smooth-skinned caterpillars in a Cholo skink.

Enemies. Recovered from the stomachs of a Wolf Snake (*Lycophidion c. capense*) at Cholo, a Hissing Sand-Snake (*Psammophis s. sibilans*) and a Vine-Snake (*Thelotornis k. oatesii*) at Mtimbuka.

Habitat. Principally on boulders at Nchisi, Chowe, and on the Lichenya Plateau where on August 20 — a sunny and moderately warm morning after a spell of cold weather — between 10.30 A.M. and 12.30 P.M. I shot 11, of which 9 were males, others were living

under the dried-out shingles of a derelict cottage.

On September 4, on Zomba Plateau, a torpid male, too chilled to move, was found beneath a fallen tree-trunk; at Chire River Bridge, Northern Rhodesia, both old and young skinks were sheltering under charred logs in the fire-swept bush; the Chiradzulu specimen was basking at a height of six inches from the ground on one of the trees forming part of an avenue; at Likabula these reptiles were fairly common upon the dessicating vegetation hoed from the footpaths.

The Tete topotypes lived among the small dried leaves drifted about the bases of the bushes that cover much of the dessicated countryside around Kasumbadedza. Undoubtedly influenced by the daily temperatures of 100° in January, they were only in evidence for a short time after sunrise, and again for an hour or two before sunset.

Ablepharus wahlbergii (Smith)

Cryptoblepharus wahlbergii A. Smith, 1849, Illus. Zool. S. Africa, Rept., App., p. 10; Natal, South Africa.

Ablepharus wahlbergii Boulenger, 1887a, p. 350; 1891a, p. 306; 1891b, p. 313.

Ablepharus carsonii Boulenger (*not* Boulenger of 1894), 1897e, p. 800; Johnston, 1898, p. 361

17 (M.C.Z. 50919–30) Nchisi Mtn. 27.xi.–8.xii.48.
1 (M.C.Z. 50931) Dedza. 21.xii.48.
2 (M.C.Z. 50932–3) Mtimbuka. 9.ii.49.
1 (M.C.Z. 50934) Chowe. 12.ii.49.
1 (M.C.Z. 50935) Kausi Village. 25.ii.49.
1 (M.C.Z. 50936) Cholo Mtn. 17.iii.49.
4 (M.C.Z. 50937–40) near Tete. 18–25.i.49.

Records. Lake Nyasa (B); "Nyika Plateau" (as *carsoni*, B). Through the courtesy of Dr. H. W. Parker, I have been able to examine the skink (B.M. 97.6.9.66) allegedly taken on the Nyika Plateau between 6000 and 7000 feet by Alexander Whyte, and referred to *carsoni* (*sic*) by Boulenger. It is a quite typical *wahlbergii*, having an interparietal distinct from the fused frontoparietals.

I also saw the unique type (B.M. 94.12.20.5 renumbered 1946.8.18. 58) of *carsonii* Boulenger (1894e, Proc. Zool. Soc. London, p. 735, pl. xlix, figs. 4–4a), described from Fwambo, British Central Africa, i.e. Fwamba, Northern Rhodesia. It is a small skink with a hairlike dark vertebral line; in its first supraocular (about equal in length to the other two) it does not differ from *wahlbergii*, and I surmise that

its sole distinguishing character — the fused interparietal — will prove to be an individual aberration when some Rhodesian can be persuaded to secure a series at Fwamba, near Abercorn.

Native names of Wahlberg's Snake-eyed Skink. *Bwezananga* (Chewa); *nshinya* (Nyungwe).

Variation. Prefrontals separated (24) or in contact (3 ex. Nchisi and Mtimbuka respectively); midbody scale-rows 24–28 (24 in M.C.Z. 50937 only; 28 in M.C.Z. 50934 only); lamellae beneath fourth toe 12–15.

Unfortunately precise notes were not made of the coloration of the two largest Nchisi skinks which were a rich red beneath. Though familiar with the rosy coloring of *wahlbergii* (? breeding) at times, I felt that these huge and handsome Nchisi skinks must represent something new. Their lepidosis, however, scarcely supports this view though all seventeen Nchisi skinks have 26 midbody scale-rows in contrast to the 22–26 one usually encounters in the countries further north and for which the subspecific name *massaiensis* Angel, 1924, is available, though its employment is inadvisable in the present state of our knowledge.

Color. The tails of very young ones are faintly blue; see note above also.

Size. Largest ♂ (M.C.Z. 50920), 94 (46 + 48) mm.; largest ♀ (M.C.Z. 50919), 93+ (52 + 41+) mm. the tail regenerating. These dimensions are equalled, or even surpassed, by one or two unusual individuals from Northern Rhodesia, Tanganyika Territory, and Kenya Colony. In the present series the next largest is a gravid ♀ (M.C.Z. 50932) of 89 (40 + 49) mm.

Breeding. On November 30, at Nchisi, two hatchlings measuring 46 (21 + 25) mm. and 55 (23 + 32) mm. respectively, were taken within a yard of each other at 11.30 A.M. when the sun shone after a downpour.

On January 18, near Tete, one of three found in a rotting log, reflected the smaller size of the local *wahlbergii* by measuring only 33 (16 + 17) mm.

On January 25, at Boroma near Tete, a young one (M.C.Z. 50939), measured 46 (21 + 25) mm. — now only 44 (20 + 24) mm., due to contraction on preservation.

Clearly the two eggs laid by this species hatch during the rains (mid-November to mid-March or April in normal years). In the gravid ♀ mentioned above, the eggs were about half-developed in February.

Habitat. At Nchisi among dead leaves on the mountainside, in the evening on paths; at Dedza on the road; at Mtimbuka among rubbish at the base of a baobab; at Kausi several were seen sharing the habitat described for *Riopa sundevallii.*

Scelotes arnoldi (Hewitt)

Sepsina arnoldi Hewitt, 1932, Ann. Natal Mus., **7**, p. 112, figs.: "Vumbu Mountains," i.e. Vumba Mountain, at 5600 feet, 20–30 miles south of Umtali, Southern Rhodesia.

♀ (A.M.N.H. 6782) Lichenya Plateau. 24.vi.–18.vii.46.

Records. New to Nyasaland, where it was taken on Mlanje Mountain at about 5800 feet, this is the second known example of the species.

Variation. Midbody scale-rows 22; supraciliaries 5 or 6; fingers 5; toes 5; lamellae beneath fourth toe 11.

Color. Apparently only in color does this specimen differ from the detailed redescription and figures of the type given by FitzSimons (1943, p. 204, figs. 84–85).

Size. Total length of this apparently spent ♀, 71+ (38 + 33+) mm., tip of tail missing.

Scelotes tetradactylus tetradactylus (Peters)

Sepsina (*Rhinoscincus*) *tetradactyla* Peters, 1874, Monatsb. Akad. Wiss. Berlin, p. 374: Zanzibar Coast.

Sepsina tetradactyla Günther, 1893 (1892), p. 555; Boulenger, 1894e, p. 725; Bocage, 1896a, p. 103; Johnston, 1897 and 1898, p. 361; Nieden (part), 1913c, p. 90.

Scelotes tetradactyla Barbour & Loveridge, 1928c, p. 168.

2 (M.C.Z. 50941–2) Lujeri River. 1 & 11.iv.49.

Records. Mlanje Mountain (Nieden); Shire Highlands (Günther); Zomba (B. & L.). Nieden's second specimen from Marungu, Belgian Congo, is presumably referable to the more attenuated western form (*S. t. hemptinnei* (Witte)).

Native name of the Four-toed Skink. *Purundwe* (Nyanja).

Variation. Midbody scale-rows 24; supraciliaries 4 or 5; fingers 4; toes 5; lamellae beneath fourth toe 3.

Size. Total length of ♂ (M.C.Z. 50941), 124 (88 + 36) mm.

Diet. The stomach contents of one have been identified for me by

Dr. Floyd Werner as: 22 worker termites, mostly large, together with an adult of about one-and-three-quarter-inch wingspread; also a roach with wingspread of about an inch.

Habitat. I personally captured the male in dry, somewhat sandy, soil beneath the roots of an enormous tree stump at edge of gallery forest fringing the river near the Lujeri Estate cattle byre. Despite intensive search on successive days in this and the surrounding slopes of Mlanje, no more were found. Though the specimen was shown to numerous natives, who were urged to search for it, the only other example of this rare skink was brought in just half an hour before our departure.

Riopa sundevallii (Smith)

Eumices (*Riopa*) *sunderallii* (misprint *sic*) A. Smith, 1849, Illus. Zool. S. Africa, Rept., App. p. 11: "Country eastward of Cape Colony" i.e. Natal, Union of South Africa.

Mochlus punctulatus Günther, 1864, Proc. Zool. Soc. London, p. 308: Zambesi Expedition.

Lygosoma sundevallii Boulenger, 1887a, p. 307; 1891a, p. 306; 1891b, p. 313; Günther, 1894a (1893), p. 618; Johnston, 1897 and 1898, p. 361.

5 (M.C.Z. 50876–9) Mtimbuka. 9.ii.49.
36 (M.C.Z. 50880–909) Kausi Village. 25.ii.49.
1 (M.C.Z. 50918) Mpimbe, Shire River (B. L. Mitchell).
11 (M.C.Z. 50910–7) near Tete, M. 14–19.i.49.

Records. Lake Nyasa (B.;G). This locality, as shown by the footnote, was about midway between my Mtimbuka, Lake Nyasa, and Kausi Village, Lake Malombe, but whether the "Zambesi Expedition" material taken by Sir John Kirk came from near the lake (in which case my Mtimbuka material is topotypic of *punctulatus*) or from the Zambezi (which would make the Tete series topotypic) remains uncertain.

Native names of Sundevall's Skink. *Jengamauta* (Yao); *nyaukaruso* (Nyungwe).

Variation. Nostril between two nasals and a supranasal or separated from the latter by a narrow rim which *very rarely* unites the two nasals so that the nostril might be said to be in a semi-divided nasal; parietals bordered by 5 (7), 6 (26), 7 (17) or 8 (2) nuchals, those in the first category might often be called "enlarged"; midbody scale-rows 26 (39), 27 (1) or 28 (12); limbs pentadactyl except for the

left fore and hind foot of M.C.Z. 50890, apparently a congenital condition and not the result of an accident; lamellae under the fourth (longest) toe 10 (6), 11 (11), 12 (20) or 13 (10).

Color. With the exception of the large black-and-white flecked specimen (M.C.Z. 50918) from Zomba District, the entire series is more or less uniformly brown above, though a lens reveals an obsolescent dark speck on each scale. Strikingly different as are these two color forms, both are fairly well represented in a series of five skinks (M.C.Z. 50284–8) that I took near Dar es Salaam, Tanganyika Territory, during the outward voyage.

Size. The largest (M.C.Z. 50918) is a dried specimen of about 190 (90 + 100) mm.; the next largest ♂ and ♀ (M.C.Z. 50886–7) both measure 80 mm. from snout to anus, but have regenerating tails.

Breeding. Ova minute in January and February, but only a couple of females examined.

Parasites. Trombiculid mites (*Ascoschongastia* sp.) were common between the toes of Tete skinks, less frequently found in the groin.

Enemies. One removed from the stomach of a File Snake (*Mehelya nyassae*) at Mtimbuka, another from an Owlet (*Glaucidium perlatum*) at Kasumbadedza near Tete.

Habitat. I took the entire Kausi series in about three hours following a shower. It was very noticeable, however, that the majority were on the east side of the trees where the soil was dry and dusty, the western aspect of the same trees had caught the rain and the ground was more moist. The skinks were beneath rubbish heaped against the trees, between the buttress roots, or in their hollow bases. Elsewhere we ound them beneath logs or rubbish.

Riopa modesta modesta (Günther)

Sepacontias modestus Günther, 1880, Ann. Mag. Nat. Hist. (5), **6**, p. 235: Mpwapwa, Ugogo, Tanganyika Territory.

1 (A.M.N.H. 67831) Kasungu. 18–23.viii.46.

Records. This, the first record of the occurrence of *modesta* in Nyasaland, constitutes a southward extension of its range by over 400 miles.

Variation. This specimen does not appear to differ from our topotypic material with which it has been compared. Midbody scale-rows 26: though the range for both *modesta* and *sundevallii* is 24–28, *modesta* is more often 24–26, while *sundevallii* is usually 26–28.

Riopa johnstoni (Boulenger)

Lygosoma johnstoni Boulenger, 1897e, Proc. Zool. Soc. London, pp. 800, 801, pl. xlvi, fig. 1: Nyika Plateau, Nyasaland; Johnston, 1898, p. 361.

Records. This species is still known only from the holotype (Brit. Mus. 97.6.4.65, renumbered as 1946.8.21.90) collected over fifty years ago by Alexander Whyte. Most of Whyte's reptiles and amphibians attributed to the Plateau appear to have been taken in the neighborhood of Livingstonia at 6000 feet or below. According to Boulenger (p. 800) Whyte collected between 6000 and 7000 feet, but on the same page he fails to list *johnstoni* as occurring on the Plateau, apparently checking it instead as Nyika District through inadvertence. Though constantly on the lookout for it during the three weeks we spent on the Nyika at 7000 feet, we failed to find it though it is quite possible it occurs sparsely in some sheltered hollow.

Remarks. When passing through London I took the opportunity to reëxamine the holotype of *johnstoni*, a species that eventually may prove to be only a race of the closely related *anchietae*. At present *Riopa johnstoni* is distinguished by having only a single (2 or 3 in *anchietae*) toe on each forelimb, and 2 (3 in *anchietae*) toes on each hindlimb.

I extend the previous range of toes in *anchietae* because of an adult and two halfgrown specimens in the British Museum (1906.7.6.1–3) which have 2 (adult) and 3 (young) toes on the forelimbs. All three come from Nandi, 6000 feet, Kenya Colony. Other material,

4 (B.M. 24.8.28.2–5) Cherangani Hills, K.C.
1 (B.M. 26.4.19.4) Lumbumbashi near Elisabethville, B.C.
1 (B.M. 93.12.27.8) Caconda, Angola.

all had 3 toes on the front limbs and 3 on the hind ones.

Melanoseps ater misukuensis subsp. nov.

Native name of Misuku Limbless Skink. *Mbulisi* (Misuku).

Type. M.C.Z. No. 50945, a gravid ♀ from the edge of Matipa Forest, Misuku Mountains, 6000 feet, northern Nyasaland. Collected by Arthur Loveridge, October 3, 1949.

Paratypes. M.C.Z. Nos. 50946–69 and five uncatalogued duplicates, all with data similar to that of the type except that they were collected between September 23 and October 15, 1950.

Diagnosis. In my (1942e, Bull. Mus. Comp. Zool., **91**, pp. 359–360) key to the genus, this form falls to section 4 (*a. ater* and *a. matengoensis*). With the typical form it agrees in lepidosis but differs by lacking the uniform black belly colouring. (*vide infra*).

It agrees with *a. matengoensis* from the highlands lying east of Lake Nyasa in having from 22–24 midbody scale-rows, but in *misukuensis* these are normally 22 (24 examples) and less usually 24 (6 ex.), while in *matengoensis* they are normally 24 (11 ex.) and rarely 22 (1 ex.). Moreover, in color, the chin and belly of *misukuensis* is usually striped longitudinally (14 ex.) though in older examples this tends to be restricted to the sides of the belly (7 ex.) and is only white in the very oldest specimens (5 ex.). In *matengoensis* the underside is white in all twelve cotypes (whose lengths from head to anus range from 87 to 166 mm.).

Description. Supranasals in contact (in all); supraoculars 3 (on both sides of all paratypes); supraciliaries 4 or 5 (in all); prefrontals absent (in all); frontoparietals absent (in all except M.C.Z. 50969); interparietal the largest head shield (except in M.C.Z. 50969); midbody scale-rows 22 (22–24 in paratypes; see *Diagnosis* above).

Color in life. ♂ paratype (M.C.Z. 50952). Above, uniformly black; below, white, each scale in the abdominal region bearing a dark spot so that they form longitudinal rows; tail uniform black like back. ♀ paratype (M.C.Z. 50955), gravid. Above, uniformly black; below, salmon pink; tail pinkish white, each scale almost obscured by its gray centre.

Color in alcohol. ♀ holotype (M.C.Z. 50945). Above, also beneath tail, uniformly iridescent black (as in all paratypes); otherwise below, from chin to anus, pure white (on account of age, longitudinally striped in the majority of paratypes as follows:— underside striate in all young under 132 mm. in length from snout to anus (viz. 86, 90, 112, 113, 119 (irregular), 121 and 131 mm.); but these striations may be retained until 163 mm. (viz. 138, 142, 145, 150, 153, 158 and 163 mm.); though in specimens of 132 mm. and over they tend to disappear along the middle line (viz. 132, 142, 150, 154, 157, 161 and 163 mm.); and are entirely absent in five examples which include the two largest, one of which has been made the type (viz. 144, 144, 162, 168 and 178 mm.).

Size. Total length of type ♀ (M.C.Z. 50945), 239 (178 + 61) mm.; of largest perfect paratype ♂ (M.C.Z. 50961), 184 (138 + 46) mm. Apparently males are smaller than females for dissection of the sixteen

largest skinks (142–178 mm. from snout to anus, average 155.6 mm.) revealed that all were females, mostly gravid. At times it is next to impossible to say whether the tail of one of these naturally stumpy-tailed skinks is regenerated or not. But by dividing the caudal length into that of the head and body of twenty-five specimens (five tailless duplicates being eliminated) it is seen to be included with a scarcely broken sequence from 2.5 to 4.0 times, there is then one with 4.6 and another with 4.9 times (the latter looking as if it might be regenerated), while the remaining four (of 5.2, 6.2, 8.5 and 9.6 times) are certainly reproduced. It seems reasonable to assume that the range is 2.5 to 4.6 times as in *a. rondoensis* Loveridge which was based on a large series. In *a. misukuensis* this range is covered by females alone, the two known males (2.7 and 3.0 times) exhibiting no sexual dimorphism in this respect.

Breeding. As indicated above, almost all females taken between mid-September and mid-October were gravid, usually holding about three elongate eggs, very approximately 10 x 5 mm., some of which contained tiny embryos.

Habitat. On October 3, I personally captured the three largest females, all gravid, beneath a felled tree-trunk lying at the forest-edge in a clearing illegally made for cultivation. The log was in full sunlight as it was noon. Most of the soil beneath the log was dry, but there was a moist patch about a foot in length and it was in this confined space that the three skinks were lying, the largest ten (now nine-and-a-half) inches, the others but little shorter.

Another female was taken in the early morning on a path passing through the forest, another beneath a log lying beside the path, a third near a stand of wild bananas, while the male, whose color is described above, was beneath a slab of rock on an eroded slope surrounded by scrubby secondary woodland.

Melanoseps ater ater (Günther)

Herpetosaura atra Günther, 1873, Ann. Mag. Nat. Hist. (4), **12**, p. 147: Zambezi.

♀ (M.C.Z. 50944) Misuku Mountains. 5.x.48.
?♂ (M.C.Z. 50943) Vipya Plateau. 17.ix.48.

Records. Both genus and species are new to Nyasaland. It will be noted that one of the specimens came from the Misuku Mountains in

which range is the Matipa Forest, type locality of the race described above. The specimen, however, was brought to camp by a native who may have fetched it up from below or from another ridge.

Native names of the Black Limbless Skink. *Bilitzi* (Nyanja and Ngoni); *malinga* (Ngoni); *malingo* (Timbuka); *mbitu* (Yao); several being due to confusion with snakes of the genus *Typhlops*.

Variation. Supranasals in contact; supraoculars 3; supraciliaries 4–5; midbody scale-rows 22.

Size. Above and below, uniformly black.

Breeding. On October 5, the female was gravid.

Habitat. The Vipya specimen was taken by the stream and bridge immediately below MacDonald's Camp.

GERRHOSAURIDAE

Gerrhosaurus validus validus Smith

Gerrhosaurus vallidus (*sic*) A. Smith, 1849, Illus. Zool. S. Africa, Rept., App., p. 9: Towards sources of Orange River, South Africa.

Gerrhosaurus robustus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 618: Tete, Mozambique.

Gerrhosaurus validus Mitchell, 1946, pp. 27, 41.

♀ (M.C.Z. 50970) near Mtimbuka. 16.ii.49.
juv. (M.C.Z. 50971) near Mpatamanga Bridge. 31.i.49.
♂♂, ♀ (M.C.Z. 50972–4) near Tete, Mozambique. 6.i.49.

Records. Salima (M). Mr. Mitchell, who so recently added the Giant Plated-Lizard to the Nyasaland fauna, believes the species also occurs at Monkey Bay and at Zomba.

Native names of the Giant Plated-Lizard. *Damalango* (Yao); *kwawhe* (Cewa, *fide* Mitchell); *kwaowa* (Nyungwe, but also applied to *major grandis*).

Variation. Supraoculars 4; supraciliaries 5–6; dorsal scale-rows transversely 30–32; dorsal scale-rows longitudinally 50–56; ventral scale-rows transversely 14–16; ventral scale-rows longitudinally 40–45; femoral pores 14–22; lamellae beneath fourth toe 19–21.

While involving slight extensions of the range as given in the generic revision (*vide* Loveridge, 1942d, pp. 492–494), these figures do not approach those of the Angolan race *skoogi*.

Size. Larger ♂ (M.C.Z. 50973), 508+ (230 + 278+) mm.; larger ♀ (M.C.Z. 50974), 584 (230 + 354) mm., the latter considerably surpassing all records for this sex.

Breeding. Ova small on January 6 and February 16. Mitchell records a Salima female as almost ready to lay in September.

Diet. Fruit and leaves were recovered from several stomachs.

Parasites. Worms (*Tachygonetria* and *Thelandros* spp.), of which one has been described as new by Mr. J. T. Lucker, present in the intestinal tracts of specimens from near Mpatamanga and Tete.

Habitat. When brought to camp by a native, the adult Tete topotypes of *robustus* were already badly decomposed, their condition being due to the daily temperatures of 100° and over. These climatic conditions also made plated lizards loth to leave their rock fissures except for brief periods after dawn and before sundown. Even then they remained close to their retreats, into which they crawled at the first sign of danger. Several large ones were seen in addition to the three I shot, but in vain I awaited their re-emergence.

Gerrhosaurus major grandis Boulenger

Gerrhosaurus grandis Boulenger, 1908, Ann. Natal Mus., **1**, p. 225, pl. xxxvi: Zululand.

♂ ♀ (A.M.N.H. 67809–10) Likabula River. vi.–vii.46.
♂ ♀ (M.C.Z. 50975–6) Likabula River. 6.viii.48.

Records. New to Nyasaland, though in the London Zoological Gardens I recently saw a Nyasaland series labeled *validus*. Its occurrence was to be expected as this form is known from the surrounding territories of Tanganyika, Mozambique, and Northern Rhodesia (for full account *vide* Loveridge, 1942d, pp. 500–501).

Variation. Supraoculars 4; supraciliaries 4–5; dorsal scale-rows transversely 18; dorsal scale-rows longitudinally 31–34; ventral scale-rows transversely 10; ventral scale-rows longitudinally 33–34; femoral pores 10–15; lamellae beneath fourth toe 13–15.

Color pattern. Conforms to that of *grandis* and not of *major*.

Size. Larger ♂ (M.C.Z. 50975), 455 (200 + 255) mm.; larger ♀ (M.C.Z. 50976), 390 (215 + 175) mm.

Breeding. Ova small in June or July, but the August ♀ held three large eggs approximately 27 x 23 mm. and the testes of the ♂ taken the same day measured about 21 x 9 mm.

Habitat. The pair I obtained were in the habit of basking half out of a tunnel near the summit of a cement-hard, six-foot-tall termitarium that, surmounted by a small scrubby tree, had its base hidden by dead

grass. Beside the base ran a trail worn by the bare feet of our boys as they passed from tent to kitchen, yet the large lizards passed unnoticed until almost the end of the fortnight that we spent at this camp.

Gerrhosaurus major major Duméril

Gerrhosaurus major A. Duméril, 1851, Cat. Meth. Coll. Rept., p. 139: Zanzibar.

♂ (M.C.Z. 50977) near Tete. 14.i.49.

Records. This is the East African coastal form and only twice recorded from Mozambique, of which the Chifumbazi record of Sternfeld (1911c, p. 417) may be *grandis* if he is referring to the Chifumbazi southwest of Lilongwe, Nyasaland. If correctly determined this form may well turn up in Nyasaland. To find it at Tete, which is only 250 feet above sea level, is not surprising.

Native name of Great Plated-Lizard. *Kwaowa* (Nyungwe, but applied also to *G. v. validus*).

Variation. Except that the dorsal scale-rows transversely are 16, and the femoral pores 11 + 11, the Tete specimen is within the range for this form given in the revision (*vide* Loveridge, 1942d, pp. 502–504).

Size. Not outstanding, viz. ♂, 463 (190 + 273) mm.

Breeding. Testes large.

Diet. Seeds in its stomach when brought in by a native.

Gerrhosaurus nigrolineatus nigrolineatus Hallowell

Gerrhosaurus nigro-lineatus Hallowell, 1857, Proc. Acad. Nat. Sci. Philadelphia, p. 49: Gaboon.

Gerrhosaurus nigrolineatus nigrolineatus Loveridge, 1942d, pp. 508–514 (generic revision).

4 (A.M.N.H. 67835–8) Kasungu. 19–23.viii.46.
♂ (A.M.N.H. 67813) Chibotela. 24.viii.–8.ix.46.
♀ (M.C.Z. 50978) Misuku Mountains. 16.x.48.
♀ (M.C.Z. 50979) Nchisi Mountain. 6.xii.48.
♂ (M.C.Z. 50981) Chitala River. 18.xii.48.
♂ (M.C.Z. 50987) near Tete, Moz. i.49.

Records. New to Nyasaland and Mozambique though common in Northern Rhodesia and Tanganyika Territory. One was seen at Nchenachena, but on account of its abundance elsewhere no effort was

made to obtain a series, a few being taken for locality or their unusual size.

Native names of the Black-lined Plated-Lizard. *Kakwasi* (Ngoni); *likwakwala* (Yao); *sambakwakwa* (Misuku); *tambalivilo* (Chewa); *zoromonda* (Nyungwe), but all undoubtedly applied to *f. flavigularis* also.

Variation. Supraoculars 4; supraciliaries 4, or 5 (on right side of A.M.N.H. 67813 only); dorsal scale rows transversely 20–22; dorsal scale-rows longitudinally 56–62; ventral scale-rows transversely 8; ventral scale-rows longitudinally 32–36; femoral pores 14–17, developed in both sexes; lamellae beneath fourth toe 15–18; head included in length from snout to anus 4.5 to 5 times.

Size. Largest ♂ (M.C.Z. 50981), and a record for the sex, 480 (160 + 320) mm.; largest ♀ (M.C.Z. 50979), 425* (160 + 265*) mm., but tail regenerated.

Breeding. Ova small on October 16 and December 6.

Gerrhosaurus flavigularis flavigularis Wiegmann

Gerrhosaurus flavigularis Wiegmann, 1828, Isis von Oken, col. 378: "Africa merid. Krebs." Günther, 1894a, (1893), p. 618; Boulenger, 1897e, p. 800; Johnston, 1897 and 1898, p. 361; Mitchell, 1946, pp. 28, 41.

Gerrhosaurus flavigularis flavigularis Loveridge, 1942d, pp. 516–520 (generic revision).

♀ (M.C.Z. 50980) Nchisi Mtn. 11.xii.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 50982–5) Mtimbuka. 7–10.ii.49.
5 ♂♂, 6 ♀♀ (M.C.Z. 50988–97) near Tete. 6–28.i.49.

Records. Fort Hill (B); Nkata Bay to Ruarawe (B); "Nyika Plateau" (B); Shire Highlands (G). The possibility should be borne in mind that some of these may refer to *nigrolineatus* as laboratory examination is often required to separate them, and these quite distinct species may be found in the same locality.

Native names of the Yellow-throated Plated-Lizard are the same as those listed under *nigrolineatus* (*vide supra*).

Variation. Supraoculars 4; supraciliaries 5, or 4 (on left side of M.C.Z. 50992 only); prefrontals separated (13 ex.) or in contact (3); dorsal scale-rows transversely 20–22; dorsal scale-rows longitudinally 60–62; ventral scale-rows transversely 8; ventral scale-rows longitudinally 34–37; femoral pores in males 10–17, they are ill-developed and concealed beneath scales in females; lamellae beneath fourth toe

17–20; head included in length from snout to anus 4.8 to 5.8 times.

Size. Largest ♂ (M.C.Z. 50982), a record for the sex, 434 (126 + 308) mm.; largest ♀ (M.C.Z. 50994), 379 (106 + 273) mm., but exceeded in body length by a ♀ (M.C.Z. 50983), 372 (127 + 245) mm. with regenerated tail.

Breeding. On December 11, at Nchisi, a ♀ held four eggs measuring 21 x 11 mm. In January and February the ova were small in all eight females. On February 10, at Mtimbuka, five eggs measuring 20 or 21 x 14 mm. were found in sandy, black-cotton soil at the base of, and partly under, a baobab growing a hundred feet from the lakeshore. The eggs held partly pigmented embryos.

Diet. Two lizards were gorged with termites; three held large black crickets with, or without, grasshoppers; in several others were well-chewed remains of beetles some of which have been identified by my colleague, Dr. P. J. Darlington Jr., as Buprestids of the genus *Sphenoptera*, and Tenebrionids of two species. The only other identifiable food consisted of two small millipedes.

Parasites. Nematodes (*Abbreviata* sp., probably *varani*) in specimens from Nchisi and Tete were saved, but those in an Mtimbuka lizard were not preserved.

LACERTIDAE

Nucras intertexta ornata (Gray)

Teira ornata Gray, 1864e, Proc. Zool. Soc. London, p. 58: "South-eastern Africa (Dr. Kirk)," later given as Zambezi (*fide* Boulenger).

Lacerta cameranoi Bedriaga, 1886, Abhand. Senckenberg. Ges., **14**, p. 378, pl., figs. 2, 9, 11, 31: Tete, Mozambique.

Nucras tessellata Boulenger (not of Smith), 1887a, p. 52; 1891a, p. 306; Johnston, 1898, p. 361; Boulenger, 1920e, p. 24; 1921a, p. 382.

Nucras intertexta var. *Holubi* Boulenger (not of Steindachner), 1920e, p. 20; 1921a, p. 381.

juv. (M.C.Z. 50986) Mtimbuka. 10.ii.49.
♂ (M.C.Z. 50998) Ndirandi Mtn. 1.i.49.
2 ♂♂, 2 ♀♀ (M.C.Z. 50999–51002) near Tete. 14–19.i.49.

Records. Lake Nyasa (B). The two lizards from the Misuku (as Masuka) and Nyika Plateaus, recorded by Boulenger (1897e, p. 800) as "*Nucras tessellata*," were later made the cotypes of *Latastia johnstoni* (*vide infra*).

Native name of the Ornate Scrub-Lizard. *Kapanga* (Nyungwe), but "*soromónda*" is said by Peters (1854, p. 616) to be the name in use at Tete when he referred his specimen from there to *delalandii*, but subsequently (1882a, p. 44) changed it to *tessellata*.

Taxonomy. It is with a little reluctance I use trinomials for there is some uncertainty as to whether these southeastern lizards should be regarded as a race of *intertexta*. The South African members of the genus appear to be in a chaotic state and much in need of a comprehensive revisionary study.

My material is topotypic of both *ornata* and *cameranoi*, the striped juvenile agreeing perfectly with Gray's original description of the former, while all the adults unquestionably represent *cameranoi* which was based on a fine adult.

In his Monograph, Boulenger (1920e, p. 24) places *ornata* in the synonymy of *tessellata* (A. Smith, 1838) and (p. 20) *cameranoi* in the synonymy of what he calls *intertexta* var. *holubi* (Steindachner), a distinctively marked Transvaal lizard of much smaller size. I had already reached the conclusion that *ornata* should be revived and *cameranoi* be made a synonym of it, when I turned up Cott's (1934a, p. 161) paper based on Mozambique material and found he had already clarified the situation somewhat, though overlooking the role of *ornata*. Cott's admirable descriptions of the strikingly different color patterns of adult and juvenile make it unnecessary for me to mention them again.

Variation. Granules between supraoculars and supraciliaries 2–4; supraciliaries 5–7; gulars between chin-shields and median gular plate 26–31; greatly enlarged collar plates 10–12; greatly enlarged plates beneath forearm 6–8; dorsals transversely 41–46; ventrals longitudinally 30–34; femoral pores 14–18; lamellae beneath fourth toe 24–30.

Size. Largest ♂ (M.C.Z. 50999), 319 (88 + 231) mm.; larger ♀ (M.C.Z. 51000), 241+ (82 + 159+) mm. as tail regenerating; juvenile (M.C.Z. 50986), 86 (32 + 54) mm.

Breeding. Ova small in January.

Diet. Beetles, black cricket, grasshopper, spider.

Enemies. The juvenile hatchling was removed from the stomach of an Eastern Beaked Snake (*Rhamphiophis o. rostratus*).

Habitat. This large lizard is an inhabitant of arid savanna scrub at low altitudes. The Ndirandi specimen was taken on the lower slopes where from time to time others were seen dashing across the road in

search of shelter among the numerous clumps of grass rising from the eroded ground. There, relying on its coloring, the lizard would remain immobile, permitting me to approach fairly near before darting away another fifty feet or so — until finally shot.

Latastia johnstoni Boulenger

Nucras tesselata Boulenger (not of Smith), 1897e, p. 800.
Latastia johnstoni Boulenger, 1907d, Ann. Mag. Nat. Hist. (7), **19**, p. 392: Misuku (as Masuka) and Nyika Plateaus, Nyasaland.
Latastia bredoi de Witte, 1942, Bull. Mus. roy. Hist. nat. Belgique, **18**, No. 41, p. 1, figs. 1–2: Musosa, Tanganyika District, Belgian Congo.
Boulenger, 1921a, pp. 16, 409; Pitman, 1934, p. 305.

♀ (M.C.Z. 51003) Bua River. 25.xi.48.

Records. Misuku Mountains (B); Nyika Plateau (B). Since the two lizards on which these records are based were collected by Whyte and presented to the British Museum by Sir Harry Johnston in 1897, no further specimens have been recorded from Nyasaland where it is not uncommon in arid upland scrub. I cannot refrain from questioning the altitude (6000–7000 feet) from which the types allegedly came. Though on the lookout, I saw no sign of *johnstoni* either in the Misukus or on the Nyika and the many examples I collected in Tanganyika were taken between 1000 and 4000 feet. Bua River is about 3200 feet. One wonders whether the cotypes were not taken by Whyte in the uplands he passed through on his way from the Nyika to the Misukus.

Pitman (1934, p. 305) merely lists the Nyika record and suggests the species may occur in Northern Rhodesia. It does, for we recently received from Dr. H. J. Bredo, what are presumably the first recorded examples (M.C.Z. 47136–7), taken between Kabuta and Mweru Wantipa.

Synonymy. In describing *Latastia bredoi*, Witte differentiates it from *johnstoni* on the grounds that it has only 6 instead of 8 ventrals transversely. It is true that Boulenger (1921a, p. 17) says the ventrals are in 8 longitudinal series, but he adds "the outermost very narrow." In our extensive Tanganyika series the outer rows on either side vary considerably in size but are mostly so insignificant that few herpetologists would consider them as ventrals. This is a condition common to many lacertids and I suggest it would be less ambiguous to describe them as 6 + 2; such a formula would help to standardize the situation and eliminate the possibility of the "2" being counted with the dorsals

transversely. I would also suggest that the phrase "dorsals *transversely*" is less likely to confuse students than the time-honored one of "dorsals in *longitudinal* series" which means precisely the same thing.

The second difference cited as distinguishing *bredoi* is that though the type had only 26 lamellae beneath the fourth toe (21–26, extremes checked, in our series of *johnstoni*, 22–25 in Boulenger's Monograph) the paratype (presumably) had 25 and 28 lamellae respectively as this is the range given for *bredoi* of which only a pair (♂ ♀) are known. To recognize a race because of a slightly higher count on a single toe of the four available scarcely seems advisable. Much depends on the precise point where one stops counting the lamellae which occasionally extend to the sole Personally I favor stopping on a level corresponding to the fork between third and fourth toe; if the count is carried on to the fork between the fourth and fifth toe several additional lamellae will be included.

Variation. Granules between supraoculars and supraciliaries 10; ventrals longitudinally 26. Most other counts are within the range of those given for *Nucras i. ornata*, a species with which *johnstoni* was formerly confused.

Size. ♀, 212 (63 + 149) mm.

Breeding. On November 25 this ♀ held 4 ova measuring about 6 x 5 mm.

Diet. A large spider in stomach.

Habitat. Shot on roadside just south of Bua River "bridge." Lizards believed to be this species were not infrequently seen on the roads but fled into the underbrush when cars approached.

Ichnotropis capensis (Smith)

Algyra capensis A. Smith, 1838, Mag. Nat. Hist., **2**, p. 94: "Sandy deserts around Latakoo," i.e. Kuruman, Bechuanaland Protectorate.

Tropidosaura dumerelii (*sic*) A. Smith, 1849, Ill. Zool. S. Africa, Rept., App. p. 7: "Sandy deserts to the north-east of Latakoo."

Ichnotropis macrolepidota Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 617: Delagoa Bay, Mozambique.

Ichnotropis longipes Boulenger, 1902, Proc. Zool. Soc. London, **2**, p. 17, pl. iii, fig. 2: Mazoe, Southern Rhodesia.

Ichnotropis overlaeti Witte & Laurent, 1942c, Revue Zool. Bot. Afr., **36**, p. 173: Kapanga, Lulua, Belgian Congo.

♂ (M.C.Z. 51007) Kasungu. 25.xi.48.

Records. New to Nyasaland.

Variation. Frontonasal single; midbody scales and ventrals 36; femoral pores 10 + 11; the adpressed hind limb reaches the ear; hind foot 1.15 times as long as head.

Synonymy. Faced with the decision as to which race this lizard should be referred, I consulted FitzSimons (1943, p. 349) whose key reads as follows: —

> Foot only slightly longer than head; adpressed hindlimb in males reaches to between shoulder and ear (exceptionally as far as ear) . . *c. capensis*
> Foot from 1¼ to 1½ times length of head; adpressed hindlimb in males reaches to ear or between ear and eye . . . . . *c. longipes*

From this it is clear the Nyasaland lizard is a typical *capensis* which does not make much sense of a northeastern or eastern race. If recognizable, however, Hewitt (1925b, p. 360) long ago pointed out that *macrolepidota* should take precedence over *longipes*. It was to *longipes* that Witte (1933m, p. 74) referred 51 lizards from Dilolo, Belgian Congo, when he furnished detailed measurements of six males whose head lengths ranged from 9–10 mm., their hind feet from 17–19 mm. so that the length of head is included in that of the foot from 1.80 to 2.11 times. Witte's head measurement was not taken from end of snout to back of ear-opening apparently, for measurements of five males (M.C.Z. 42873–8, etc.) from the same Dilolo series show head lengths of 15–16 mm., hind feet of 18–19 mm., and consequent inclusion of head into foot lengths of 1.18 to 1.26 times, their adpressed hind limbs extend to between shoulder and ear (2 ex.) or to ear (3 ex.).

Examination and scale counts of all our material suggests that the head/foot ratio of males provides no basis for separation of a zoogeographical race, the conclusion being that the adpressed hind limb of males normally reaches the ear but may sometimes fall short or extend beyond. I am assured by Mr. C. J. Battersby that it extends beyond in all three cotypes of *longipes* whose head to ear measurements are 12.5, 12 and 12 mm., the corresponding hind foot to heel measurements being 15, 15 and 16 mm. A summary of the material in the Museum of Comparative Zoology furnishes the following results: —

Adpressed hind limb reaches to between *shoulder and ear*, or to *ear*.

5	males from Dilolo, Belgian Congo	2	3
1	" Waterberg Plateau, S.W. Africa	1	0
1	" Chishawasha, S. Rhodesia	0	1
3	" Waterberg District, Transvaal	3	0

3 males Lourenço Marques, Mozambique	1	2
1 " Kasungu, Nyasaland Protectorate	0	1

An additional character employed for the separation of *longipes* in Boulenger's (1921a, p. 180) monograph, but omitted for good reason by FitzSimons (1943, p. 349) in his key, is the length of the anterior supraocular, said by Boulenger to be "as long as or a little shorter than its distance from the second loreal" in *capensis*, but which FitzSimons finds (p. 353) "as long as or a little longer than its distance from (the) posterior loreal." A definition with which our twenty-two specimens conform. Apparently it was Boulenger's statement that led Witte and Laurent to separate *overlaeti* from *capensis* on the grounds that the anterior supraocular was "plus longue que la distance qui la sépare de la frénale postérieure."

Ichnotropis squamulosa Peters

Ichnotropis squamulosa Peters, 1854, Ber. Akad. Wiss. Berlin, p. 617: Tete, Mozambique. Boulenger, 1887a, p. 79; 1897e, p. 800; Johnston, 1898, p. 361; Boulenger, 1921a, pp. 191, 425.

♂ ♀ (M.C.Z. 51004–5) near Tete. 14–18.i.49.

Records. Fort Hill (B); Lake Nyasa (B). There is also a specimen from Cholo in the British Museum (A.L.).

Native name of Rough-scaled Sand Lizard. *Karangawoni* (Nyungwe).

Variation. Frontonasal paired; midbody scales and ventrals 44–50; femoral pores 13–17; the adpressed hind limb reaches the ear or just beyond; hind foot 1.21 to 1.33 times as long as head.

Color in life. ♂. Above, head muddy brown, side of head lighter, labials white; mid-line of back muddy brown flanked by a series of light spots beyond which is a series of squarish black marks alternating with rusty-red ones, outside this again a white dorsolateral line starts from the elongate temporal; flanks with a corresponding series of squarish black marks alternating with rusty-red ones below which is a white line that commences at the ear-opening and continues to the insertion of the hind limb; below it again a further series of alternating black and rusty-red marks; limbs rusty brown flecked with black and white; tail buff with indistinct fleckings. Below, uniformly white.

Breeding. Ova small in January.

Diet. A caterpillar in one; many termites in the other.

Habitat. Running about eroded ground on the outskirts of Kasumba-

dedza Village, where ♀ was shot after sunset as a blood-red new moon was rising over the thornbush.

Holaspis guentheri laevis Werner

Holaspis Guentheri laevis Werner, 1895, Verh. Zool. Bot. Ges. Wien, **45**, p. 191, pl. v, fig. 4· Usambara Mountains, Tanganyika Territory.
Holaspis guentheri Boulenger (part), 1921a, pp. 378, 379, 380, 440.

♀ (M.C.Z. 51006) Ruo River Market. 3.viii.48.

Records. Zomba (B). Our specimen from the foot of Mlanje Mountain is the second to be recorded from Nyasaland.

Variation. Dorsals transversely 71; ventrals transversely 6; femoral pores 21 + 23.

Color pattern. I revive Werner's race because I find all our East African material is separable from typical *guentheri* as follows: —

A dorsolateral and two lateral dark longitudinal lines; range: Tropical West Africa from Sierra Leone south to Angola east to Uganda .... *g. guentheri*

A dorsolateral and one lateral dark longitudinal line; range: Tropical East. Africa from northeast Tanganyika Territory south to Amatongas, Mozambique ..... *g. laevis*

Size. ♀, 106 (47 + 59) mm.

Breeding. On August 3 this female held two eggs measuring 9 x 6 mm.

Habitat. Basking about ten feet up on one of the tree trunks in the row separating the market from the main road.

AMPHISBAENIDAE

Monopeltis sphenorhynchus Peters

Monopeltis sphenorhynchus Peters, 1879b, Monatsb. Akad. Wiss. Berlin, p. 275: Inhambane, Mozambique (now restricted). Boulenger, 1885e, p. 455; 1891a p. 306; Loveridge, 1941a, p. 427, fig. 47 (revision).

Records. Shire Valley (B); "Zambesi," i.e. Zambesi Expedition (B). In addition Mr. Mitchell informs me that he once took what he believes was a species of *Monopeltis* at Chitala River. But for this one might argue that the earlier records referred to that part of the Shire Valley which is in Portuguese territory.

Remarks. As the Wedge-snouted Worm-Lizard is the only member of its genus having two lower labials it would be of considerable interest to have more material to see if this character is constant.

Habitat. Worm-lizards burrow in sandy or laterite soils, rarely appearing on the surface except after heavy rain or when attacked by driver ants. Had the rains materialized during my visit to Nyasaland I felt confident that I would have secured not only *Monopeltis* but probably undescribed species of the genus *Amphisbaena* which occurs in the surrounding territories.

CORDYLIDAE

Cordylus cordylus tropidosternum (Cope)

Zonurus tropidosternum Cope, 1869, Proc. Amer. Philos. Soc., **11**, p. 169: "Madagascar" (presumed error for Mozambique).
Zonurus cordylus Boulenger (not Linné), 1897e, p. 800; Johnston, 1898, p. 361
Cordylus cordylus tropidosternum Loveridge, 1944p, p. 35 (revision).

Records. Fort Hill (B); Misuku Mountains (B); "Nyika Plateau" (B). Due to an oversight these specific localities were omitted from those cited on page 36 of my revision of the family.

Enemies. Though I failed to collect the Eastern Girdle-tail in Nyasaland, I recovered the tail of one from the stomach of a Vine-Snake (*Thelotornis k. capensis*) killed at Chowe, near Fort Johnston. The tail of a *Cordylus* with its great whorls of spines is not to be mistaken for that of any other genus, not excluding *Gerrhosaurus.*

Platysaurus mitchelli sp. nov.

Type. M.C.Z. No. 50657, an adult male, though testes small, from Ruo River Forest, Mlanje Mountain, Nyasaland. Collected by Arthur Loveridge, March 31, 1949.

Paratypes. M.C.Z. Nos. 50658–75, being 18 specimens representing both sexes with the same data as the type.

Diagnosis. This, the most northerly *Platysaurus* known, appears to be ancestral to the nine other members of the genus from all of which it differs by possessing a pair of supranasals[1] and 12 (instead of 16 to 26) quadrangular ventrals in longitudinal series across the belly. Femoral pores are equally developed in both sexes. *P. mitchelli* combines certain differential characters utilized in the first major division of my key to the genus (1944p. p. 83), agreeing with the first portion of section 1 only in having the anterior aspect of the limbs covered with strongly keeled scales, but in the four remaining characters it

[1] For in *capensis* the nostril is usually considered as being between the upper and lower portions of a divided nasal.

conforms to the second portion of the section and would appear to be more closely related to the Transvaal races of *guttatus* occurring at Barberton (*wilhelmi*), on the Waterberg (*minor*) and on the Drakensberg (*orientalis*), rather than to the large forms residing in arid lowlands.

Description. Type ♂. (Paratype variations in parentheses, for which purpose both sides of every specimen have been examined unless otherwise stated). Rostral twice as broad as high, separated from the frontonasal by a pair of supranasals; frontonasal much shorter than broad, separated (in contact in M.C.Z. 50668 only) by a pair of prefrontals from the frontal; frontal broader anteriorly; a pair of postfrontals; two pairs of parietals; interparietal large, diamond-shaped, posteriorly in contact (*separated* in all but two of the paratypes) with a *very* small, wedge-shaped and divided occipital; a nasal; a postnasal; a loreal; a preocular; supraoculars 4; supraciliaries 4; 4 upper labials anterior to the suboculars; suboculars 4, second and third reaching the lip, the last much reduced; lower labials 5 (4–6); sublabial shields 6 (5–6), the last much reduced; enlarged temporals in two longitudinal rows, the uppermost much the larger (the centre of the lower row is replaced by granules in M.C.Z. 50669 only).

Side of neck covered with more or less uniform small granules; collar scales 11 (9–13), many only slightly enlarged; granules on flanks subuniform; ventrals forming 12 (flanked by an undeveloped outer row) regular longitudinal and 40 (36–40) transverse rows, those nearest the collar and preanal region almost granular; limbs covered anteriorly with keeled scales; the adpressed hind limb reaches the neck; femoral pores 20 (18–21) counted on left thigh only (present in both sexes).

Color in life. Type ♂. (Which, as the largest, was selected in the field and the following description recorded). Above, black; rostral, upper labials and lower temporals faintly greenish; from frontonasal to base of tail a yellow vertebral line that anteriorly is more or less broken up into a series of dashes, posteriorly into a series of juxtaposed spots; on either side is a yellow dorsolateral line starting from the lower edge of the supraoculars and supraciliaries where, as also in the temporal region, it is interrupted, then continues as a complete line to base of tail; limbs and flanks indistinctly spotted with cream; digits crossbarred with white; tail brownish black, dorsolaterally faintly streaked with creamy white. Below, mental salmon pink, lower labials and sublabials pale blue; gular region anteriorly tinged with pink but posteriorly a rich blue; chest, belly and limbs greenish white; tail buff

or slightly pinkish white.

Size. Total length of ♂ holotype, 136 (46 + 90) mm., though in the field it measured 140 (48 + 92) mm.; paratype ♀ (M.C.Z. 50673), 123 (42 + 81) mm.; the head and body length of the remaining seventeen paratypes ranged from 39 to 52 (average 43.6) mm.

Sexual dimorphism. I thought there was a color difference in life but neglected to note it down and now the sexes are separable only by dissection; it is clear that they were not breeding.

Diet. Ants, a grasshopper, and a spider, in the type.

Habitat and *Remarks.* To me this species appears the least specialized member of the genus for it does not require fissured rocks but lives on boulders flanking the small mountain torrent tributaries of the Ruo River where they pass through the Ruo Forest. In places the sides of such torrents have been protected from erosion by sloping brick walls or cement work, much overgrown by moss. On these the lizards basked like so many *Lacerta muralis* and when pursued were at a loss to find a fissure in which to hide. Others were seen sunning on the short rough planks forming the bridges that spanned the gullies. In this situation the lizards were next to impossible to catch for the first footstep of an approaching person on the bridge was sufficient to make them slip over the side and underneath. Of all the situations in which I found them, the strangest was the sloping, more or less mossgrown, cement basework of the pumping power station in a clearing of the forest, and there they were as numerous as anywhere.

The first half-dozen seen on bridges or boulders, I shot, but the rest of the series we caught by hand, heading them off with the help of my gunbearer until, bewildered, the small reptiles sought refuge in some shallow hole or beneath my boots. Where numerous, they probably fight a good deal among themselves for 7 out of 12 had regenerating tails when captured; the first 5 shed theirs when shot. Associated with them at the pumping station were a few skinks (*Mabuya q. obsti*) which they closely resemble in longitudinal striping, indeed the Nyanja natives failed to distinguish them, calling both species *nabulusi*, a name more properly belonging to the well-known skink.

Though I visited their haunts on half-a-dozen days, apparently temperature and weather conditions were never exactly right for *mitchelli* except on March 31 when the sun broke through and shone warmly for an hour or two about noon. On no other occasion did I get more than a fleeting glance of an occasional lizard.

To me *mitchelli* appears to be the least specialized member of the genus, and suggests the speculation that in the days when Africa was more heavily forested, *Platysaurus*, which is no more flattened than the lacertid *Holaspis*, was also an arboreal form that sought shelter beneath slivers of bark.

Soon after our return from the Likabula River, Mlanje Mountain, Mr. B. L. Mitchell asked me if I had collected any *Platysaurus*, a genus with which he was familiar in Southern Rhodesia and that he had seen on boulders bordering the Likabula just above the Forestry Depot. I had not, but during our afternoon visit to the Ruo River I had seen, but failed to get, a small lizard that I assumed was a skink. Mr. Mitchell's mention of *Platysaurus* proved a principal factor in my decision to return to the Ruo Forest for a longer stay. I take pleasure, therefore, in naming this very distinctive species after the first person to have recognized the presence of *Platysaurus* in Nyasaland, almost 150 miles northwest of its known range.

Platysaurus guttatus nyasae subsp. nov.

Type. M.C.Z. No. 50655, an adult female from rocks on *right* side of the Blantyre to Tete road a mile or so *south* of Mpatamanga Bridge, Nyasaland. Collected by Arthur Loveridge, January 31, 1949.

Paratype. M.C.Z. No. 50656, an adult female with the same data as the type.

Diagnosis. Most nearly related to *P. g. rhodesianus* FitzSimons, from which it differs in having subuniform granules on the side of the neck (instead of a patch of greatly enlarged ones as in female *rhodesianus*); in having 5–6 (instead of 4–5) upper labials anterior to the suboculars; 37 (instead of 40–48) ventrals in a line from collar to groin-row; and a relatively shorter tail, viz. 116 mm. for the type with a snout to anal length of 91 mm. (as against 149 mm. for a 92 mm. *rhodesianus*); the longitudinal dorsal stripes are narrower and the characteristic spotting on the flanks is lacking.

Description. Type ♀ (Paratype variations in parentheses). Rostral twice as broad as high, separated from the frontonasal by an internasal (or by the nasals); frontonasal as long as broad; frontal broader anteriorly; a pair of postfrontals; interparietal small, diamond-shaped, enclosed between two pairs of parietals and widely separated from a small, wedge-shaped occipital (which is posterior to the parietal suture in the paratype); a nasal; a postnasal; a loreal; a preocular; supra-

oculars 4; supraciliaries 4; 5–6 upper labials anterior to the suboculars; suboculars 4, the second and third reaching the lip; lower labials 5–6; sublabial shields 5 (4-6); enlarged temporals in 2 longitudinal rows.

Side of neck covered with more or less uniform small granules; granules on flanks enlarged; collar scales 11 (12); ventrals forming 18 regular longitudinal and 37 transverse rows; limbs covered anteriorly with granules and rugose, strongly keeled scales; the adpressed hind limb reaches the axilla; no femoral pores.

Color in formalin. Above, head, back, flanks and limbs blackish, unspotted, but with three, light, sharply defined, narrow, longitudinal lines extending from snout or supraoculars to base of tail; tail pale buff, medially with a broad, but rapidly tapering, black line that breaks up into a series of dusky blotches on the proximal portion of each verticil around which they spread to produce an annulate effect on the distal third of the tail. Below, white, with dusky flecks scattered sparsely on chin and gular region, more abundantly on chest, along the sides of the belly, and on the hind limbs; neck just in front of collar exhibits three dusky streaks; tail almost immaculate.

It is unfortunate that the beautiful coloration of the living lizard was not recorded, an omission resulting from the exigencies of motorized travel.

Size. Total length of ♀ holotype (M.C.Z. 50655), 207 (91 + 116) mm., that of the ♀ paratype (M.C.Z. 50656), 194 (90 + 104+) mm., the tip of its tail being missing.

Parasites. Nematode worms (*Pharyngodon* sp. 2 ♀ ♀, and *Thubunaea* sp. 2 imm.) were recovered from the stomachs of the types, and identified for me by Mr. J. T. Lucker.

Habitat. The massive rocks where I shot these *Platysaurus*, the first members of the genus to be taken north of the Zambezi, also harbored *Agama k. kirkii, Gerrhosaurus v. validus, Mabuya q. margaritifer,* and *M. lacertiformis,* the last mentioned also new to Nyasaland.

Platysaurus guttatus torquatus Peters

Platysaurus torquatus Peters, 1879a, Sitzb. Ges. Naturf. Freunde Berlin, p. 10: Tete, Zambezi River, Mozambique.

5 ♂♂, 3 ♀♀ (M.C.Z. 50647–54) near Tete. 20–28.i.49.

Native name. Sankwata (Nyungwe). Peters gave *bunio* as the name applied to this species at Tete, but this is a variant of *mbuniu,* the

Nyungwe name for *Mabuya q. margaritifer*.

Variation. This topotypic series agrees with the key characters of my (1944p, p. 83) revision, except that the occipital wedged between the posterior parietals cannot be termed "large" as it is frequently broken up and subject to fusion with the interparietal. The following constitute extensions to the variation listed for this race in the statistical table on p. 85. Rostral 2–2½ times as broad as high; collar scales 6–8; ventrals in 16–19 longitudinal, and 35–39 transverse rows.

Size. None surpass the cotypes' measurements.

Color. That of the chin and throat described on page 84 is of a subadult male, for the throats of adult males are substantially black. In alcohol the sexes may be distinguished by the pink color of the male tail as compared with the dark tails of the females.

Habitat. This is apparently restricted to a particular type of rock that is subject to sun-splitting in a way that gives rise to very narrow fissuring. Shortly after my arrival at Kasumbadedza I began enquiring of the villagers as to where *Platysaurus* might be found. Several averred they were acquainted with *Platysaurus* but I fancy most of them were confusing it with the rock-dwelling *Mabuya q. margaritifer* whose male and female bear an astonishing resemblance to the corresponding sexes of *Platysaurus g. torquatus*.

Being especially anxious to secure topotypic material I kept a constant lookout for the lizard yet nearly three weeks elapsed before we found the first. Then one evening I was collecting among the rocks called Mwanza close to the bank of the Zambezi when my gunbearer halted abruptly and, moving only his eyes to indicate a rock at his elbow, said slowly: "Sir, anuzzer kind." From where I was, about twenty feet away, I replied: "It's only a halfgrown (*margaritifer*)," but shot it nevertheless, and was delighted to discover that it was indeed the long-sought *torquatus*. After that it was relatively easy to shoot another half-dozen for the members of this particular colony appeared less wary and alert than the *margaritifer* occurring on the same rocks. Previously I had passed within a hundred feet of these rocks without seeing a *Platysaurus* for they occupied a very restricted area.

VARANIDAE

Varanus niloticus niloticus (Linné)

Lacerta nilotica Linné, 1766, Syst. Nat. ed. 12, **1**, p. 369: Egypt.
Monitor niloticus Günther, 1864b, p. 307.

Varanus niloticus Boulenger (part), 1885e, p. 317; 1897e, p. 800; Johnston, 1898, p. 361; Mitchell, 1946, pp. 28, 41.

♀ (M.C.Z. 51008) Chitala River. 17.xii.48.
2 ♂♂, 3 ♀♀, 4 juv. (M.C.Z. 51009–17) Mtimbuka. 7–24.ii.49.
♀ (M.C.Z. 51018) Kausi Village. 25.ii.49.
♀ (M.C.Z. 51019) near Tete. 20.i.49.

Records. Karonga to Kondowe (B); Nkata Bay to Ruarwe (B). Mr. Mitchell informs me that he has seen this species at Chikwawa; Chiromo; Fort Johnston; Monkey Bay; Port Herald; and Zomba.

Native names of Common Water-Monitor. *Mwanzi* (Nyungwe); *sakata* (Yao). See also Mitchell *loc. cit. supra.*

Variation. An examination of all the *niloticus* material in the Museum of Comparative Zoology necessitates a slight modification of the key in Mertens' (1942c, p. 320) monumental revision of the Varanidae, viz:

3–5 transverse rows of yellow spots or crossbars between fore and hind limbs ..... *n. ornatus*
6–9, rarely 5, rows of yellow spots or crossbars between fore and hind limbs ..... *n. niloticus*

Size. Larger ♂ (M.C.Z. 51009), 835 (305 + 530) mm.; largest ♀ (M.C.Z. 51016), 906 (326 + 580) mm.

Breeding. In mid-February young monitors ranging from 321 (126 + 195) to 346 (138 + 208) mm. were plentiful enough near the lakeshore though it is commonly remarked that young monitors are hard to find.

Diet. Stomach contents of the Mtimbuka lizards were: — (1) three crushed *Cycloderma frenatum* eggs, shells and all, also a large mole cricket; (2) a lizard or snake's egg, grasshopper, caterpillar; (3) a sizeable bullfrog (*Rana a. edulis*); (4) four small fish which may or may not have been found dead; (5) a large cricket; (6) a very large caterpillar; (7) about two dozen pupae of the greenbottle fly whose larvae had been feeding on the carcass of a baboon.

Parasites. Ticks (*Aponomma* sp.) were preserved from the Kasumbadedza monitor, and nematodes (*Tanqua tiara*)from several Mtimbuka specimens, also an *Amplicaecum* sp. from a monitor taken at Mikindani, Tanganyika Territory in April, 1939.

Enemies. A juvenile was recovered from the stomach of a Stripe-bellied Sand-Snake (*Psammophis s. subtaeniatus*) killed at Kasumbadedza.

Habits. The adult Chitala monitor was resting on grass and debris floating in about five feet of water in an abandoned well up whose twenty-foot sides the lizard could not climb. An exceptionally large adult was seen sunning on the summit of the frondless trunk of a drowned coconut palm towering thirty feet above the waters of the lake; as our boat approached the reptile, it crawled in leisurely fashion into the palm's hollow interior. Within a few yards of the lakeshore, at a height of twelve feet from the ground, a halfgrown monitor was clinging to a mat of creepers smothering a bush or small tree. Apparently sunning, it ignored our presence so that I was able to kill it with dust shot fired from the .22 through its crown. A possible explanation of its lethargy was its gorged condition as listed above under (1). At 5.30 P.M. one dull afternoon just before sunset I observed a young monitor (M.C.Z. 51013) ten feet from the ground on a twig of a bare and leafless thorn tree where the lizard presumably intended to pass the night. At 8.40 P.M. the same evening my flashlight revealed another lying along a spray overhanging a deep pool; on either side of the twig the lizard's legs hung limply down, the claws of each pair touching or almost touching each other.

On Bwadzulu Island in Lake Nyasa these monitors are especially abundant. On his return from a visit to the island in Easter, 1947, Mr. B. L. Mitchell wrote (10.iv.47) that he had never before encountered so many of the reptiles; at times three or four would be disturbed at once though he thought the average would be nearer one per hundred yards walked.

Varanus exanthematicus microstictus Boettger

Monitor microstictus Rüppell, 1845, Mus. Senckenberg., **3**, p. 301: (*Nomen nudum*).

Varanus microstictus Boettger, 1893a, Kat. Rept. Samml. Mus. Senckenberg. Naturf. Ges., Part 1, pp. viii, 72: Ethiopia.

Varanus ocellatus Johnston (not of Heyden), 1897 and 1898, p. 361.

Varanus (*Empagusia*) *exanthematicus microstictus* Mertens, 1942c, p. 355: (revision).

Records. The Eastern Savanna-Monitor is the dry country species that for a whole century has been miscalled the Eyed Monitor, *V. ocellatus* (Heyden in Rüppell), a name that Mertens (1942c, p. 352) found was actually synonymous with typical *V. e. exanthematicus* (Bosc) of Senegal. Whether it actually occurs in the Protectorate is

not known (the matter is discussed below) but true *microstictus* occurs in extreme southeast Tanganyika Territory for we have half-a-dozen examples from Mikindani. The precise meeting place of the two forms remains to be worked out. To the Yao at least it would be known as *ligondo*, if present.

Varanus exanthematicus albigularis (Daudin)

Tupinambis albigularis Daudin, 1802, Hist. nat. Rept., **3**, p. 72: pl. xxxii: Type locality unknown.

Varanus albigularis Boulenger, 1885e, p. 307; 1891a, p. 306; Johnston, 1897 and 1898, p. 361.

Varanus (*Empagusia*) *exanthematicus albigularis* Mertens, 1942c, p. 357: (revision).

Neranus (*sic*) *albigularis albigularis* Mitchell, 1946, pp. 28, 41.

2 ♂♂, 3 ♀♀ (M.C.Z. 51020–4) near Tete. 12–20.i.49.

Records. The inclusion of this race in the Nyasaland fauna rests chiefly on the young individual (B.M. 77.7.2.1) from Lake Nyasa recorded by Boulenger. This specimen has been re-examined by Messrs Parker and Battersby who consider it conforms with *albigularis*, rather than with *microstictus*, in possessing nuchal scales that (without their surrounding disks) are no larger than those on occiput and back. In the number of its midbody scale-rows (135) and ventrals (90 between collar and hind limbs) it might belong to either form. Nyasaland is in an area of intermediates and we shall not know what is the correct name to apply to monitors from the Protectorate until some resident is willing to take the trouble to collect and preserve a representative series carefully labeled as to precise locality.

According to the Yao I questioned, the *ligondo* occurs on the eroded rocky hills to the north and east of Mtimbuka. I failed to find any there during the brief time at my disposal, but I believe that Mr. B. L. Mitchell has captured live ones in the vicinity as well as in other parts of the Protectorate.

Native name of White-throated Savanna-Monitor. *Ligondo* (Yao); *Gondwa* (Nyungwe); see also Mitchell (1946, p. 41).

Variation. Midbody scale-rows 135–148; ventrals longitudinally from collar fold to level of hind limbs 88–98. These scale-counts (extremes checked) conform to the range of *albigularis* as defined by Mertens (1942c, p. 351).

However, in the major key character as to the relative size of nuchal

and dorsal scales in the various races of *exanthematicus*, there is so much variability in the series, more especially between the oldest and youngest females, that I find it difficult to decide whether the nuchal scales, without their surrounding disks, are "as large as" or "distinctly larger than" those on the occipital region and dorsum. In this character I am inclined to think the series as a whole agrees more nearly with the definition of *microstictus* rather than with *albigularis*. In view of the locality being on the borderline between the ranges of the two forms, this is not surprising.

Size. Larger ♂ (M.C.Z. 51020), 705 (305 + 400) mm.; largest ♀ (M.C.Z. 51022), 880 (400 + 480) mm.; smallest ♀ (M.C.Z. 51024) 511 (236 + 275) mm.

Diet. In one male a scorpion, two *Brachystegia* crickets, numerous hard-shelled beetles, and a millipede; a female held many cockroaches, a half-grown *Brachystegia* cricket, and the remains of several millipedes.

Parasites. Both ticks (*Aponomma* sp.) and nematodes (*Abbreviata paradoxa; Polydelphis* (*Hexametra*) sp.; *Tanqua tiara*) were preserved.

TYPHLOPIDAE

Typhlops tettensis obtusus Peters

Typhlops (*Onychocephalus*) *obtusus* Peters, 1865a, Monatsb. Akad. Wiss. Berlin, p. 260, pl., fig. 2: Shire River, Nyasaland (emended). Peters, 1882a, p. 95; Boulenger, 1891a p. 396; 1893b, p. 38; Günther, 1893 (1892), p. 555; Bocage, 1896a, p. 90; Boulenger, 1896d. p. 586; Johnston, 1897, p. 362; 1898, p. 361a; Boulenger, 1915c, p. 615; Werner, 1921b, p. 313.

Typhlops decorosus Sternfeld (possibly not of Buchholz & Peters), 1908c, p. 242.

Typhlops tettensis obtusus Loveridge, 1942e, p. 257 (key, but unreliable).

2 ♀ ♀ (M.C.Z. 51025–6) Cholo Mtn. 18 & 24.iii.49.
3 ♂ ♂, 2 ♀ ♀ (M.C.Z. 51027–31) Mlanje Mtn. 1–4.iv.49.

Records. Blantyre (coll. Mitchell: in Brit. Mus.) Mlanje Mtn. (S); Shire Highlands (G); Shire River (P); Shire Valley (B); Zomba (coll. Johnston: in Brit. Mus.). Sternfeld's record of *decorosus* appears in a paper entitled "Schlangen aus Britisch-Ostafrika" dealing with the snakes of Uganda and Kenya where he apparently thought "Milanji, Brown" was situated. The late M.A. Brown, a well-known resident of Nyasaland, owned three cottages on Mlanje and the route he pioneered up to the plateau known as "Brown's road" lies fairly near where I collected the specimens listed above.

Native name of Shire Blind-Snake. *Ntonga* (Manganja and Nyanja).

Variation. Preocular in contact with second and third labials, (as is the case with a Blantyre and Zomba snake in the British Museum, but in a Shire Snake and both cotypes in contact with the second only), ocular with third and fourth (or third only in one type and two other snakes in Brit. Mus.); eye indistinguishable except in smallest specimen, though its probable position is usually indicated by a spot of pigment; midbody scale-rows 24 (22–23 in Brit. Mus. material); midbody diameters 3–6 (4–5–6 in Brit. Mus.); being included 47–74 (44–75.5 in Brit. Mus.) times in total length; tail length from 90–99 times in known ♂♂, 120–141 times in ♀♀.

Keys based on relative proportions of museum material are apt to be misleading when applied in the field to freshly killed examples of such attenuated, elastic-like snakes as these. The following comparative figures will serve to illustrate the point.

		Measured in field			*Measured in laboratory*		
Cat. Nos.	Sex	Head & Body	Tail	Tail into total L.	Head & Body	Tail	Tail into total L.
M.C.Z. 51031	♂	158.5	1.5	106	141.5	1.5	95
51030	♂	327	3	110	295	3	99
51028	♂	391	4	98	356	4	90
51027	♀	387	3	130	357	3	120
51025	♀	319	3	107	308	3	103

Boulenger's (1893b, p. 11) key separates *obtusus* from *decorosus* solely on the diameter/total length ratio, 43–50 for *obtusus*, 60 for *decorosus*. It will be seen that our almost topotypic series of *obtusus* nearly embraces the entire range for both species!

T. decorosus Buchholz & Peters, 1875, is a Cameroons species and Sternfeld's identification of a Mlanje snake with it serves to draw attention to their very close similarity. They may even prove to be specifically identical judging by our single, much-damaged, example of *decorosus* from Sakbayeme, French Cameroon.

Size. Largest ♂ (M.C.Z. 51028), 360 (356 + 4) mm.; largest ♀ (M.C.Z. 51027), 360 (357 + 3) mm.

Diet. The stomach of one was full of long, fat-bodied, flying ants, that of another with termite larvae; intestines of a third with termite remains.

Parasites. A nematode worm (*Kalicephalus* sp.) was recovered from a Mlanje snake.

Habitat. The smallest, a rather pallid pink in life, was found beneath a log on the hillside beyond the cattle boma near the Lujeri River; it was gorged with termite larvae from a nearby nest. We dug down about eight inches beneath where it had been lying and took the second largest male. All our Mlanje blind-snakes were collected between the Lujeri and Ruo Rivers which eventually flow into the Shire.

Typhlops schlegelii mucruso (Peters)

Onychocephalus mucruso Peters (part), 1854, Monatsb. Akad. Wiss. Berlin, p. 621: Maçanga, i.e. Makanga, Mozambique (restricted).

Typhlops mucruso Boulenger, 1896d, p. 588; 1897e, p. 800; Johnston, 1898, p. 361a; Bogert, 1940, p. 16.

1 (M.C.Z. 51032) Misuku Mtns. 2.x.48.
1 (M.C.Z. 51033) Mtimbuka. 11.ii.49.
2 (M.C.Z. 51034–5) Blantyre. xi.46 & 8.iii.49.

Records. Fort Johnston (Bogert); Nkata Bay to Ruarwe (B); Zomba (B). The Blantyre specimens were presented to me by Mr. B. L. Mitchell.

Native name of North Zambezi Blind-Snake. *Mbitu* (Yao); *mbuluzi* (Misuku, but also applied to *Melanoseps*).

Variation. Midbody scale-rows 34; diameter included in total length 35–40 times.

Color. The three smaller (200–325 mm.) specimens are gray above, punctate with black; below, white. The two-foot individual is a handsome chestnut-brown heavily blotched with black, these markings encroaching on the underside laterally but leaving the median line of the belly immaculate as in the younger specimens.

Size. Largest (M.C.Z. 51035), 620 (614 + 6) mm. Diameter 17.5 mm.

Typhlops schlegelii schlegelii Bianconi

Typhlops schlegelii Bianconi, 1850, Spec. Zoöl. Mosamb., p. 13, pl. iii, fig. 1: Inhambane, Mozambique.

Onychocephalus dinga Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 620: Chupanga; Sena; and Tete, Mozambique.

Onychocephalus mucruso Peters (part), 1854, Monatsb. Akad. Wiss. Berlin, p. 621: Tete, Mozambique.

2 (M.C.Z. 51036–7) near Tete. 21.i.49.

Range. But for the drought I had hoped, by collecting large series of this species, to be in a better position to define the ranges of the two forms found in the Zambezi region. Previously I (1933h, pp. 214–222) somewhat arbitrarily, in view of the difficulties, designated the Zambezi as serving the purpose of demarcating the two forms which are separable only on the basis of a higher average number of midbody scale-rows — 30–38 north of the Zambezi (*T. s. mucruso*), 32–44 south of the river (*T. s. schlegelii*). On the basis of the figures given below, my south Zambezi material might, with equal justification, be referred to the northern form. Indeed, it was from Tete that some of Peters' cotypes of *mucruso* came, his "species" being based on color pattern supported by native nomenclature and belief that two species were represented. The name *mucruso* is restricted to the Makanga cotypes, Makanga being just west of the Kirk Range on the Nyasaland frontier.

Native names of South Zambezi Blind-Snake. *Dinga* and *mucruso* (Nyungwe for the larger and smaller color phases).

Variation. Midbody scale-rows 34; diameter included in total length 30–45 times.

Color. The third-grown specimen is gray above, checkered with black; the larger one greenish black, each scale bearing a light fleck; in both the median line of the belly is immaculate.

Habits. As might be expected when daily temperatures were 100° or more, both these snakes emerged during or after a shower. One was brought in late at night and the other early the following morning.

LEPTOTYPHLOPIDAE

Leptotyphlops conjuncta distanti (Boulenger)

Glauconia distanti Boulenger, 1892a, Reptilia and Batrachia, in W. L. Distant, "A Naturalist in the Transvaal," p. 175, fig.: Pretoria, Transvaal. Boulenger, 1893b, p. 62; 1897c, p. 800; Johnston, 1898, p. 361a.

Records. Fort Hill (B).

Remarks. One would have supposed this specimen, which I have not examined, was referable to the common East African form, *L. c. conjuncta* (Jan). However, Mr. Battersby informs me that the rostral is more than half the width of the head and it consequently agrees with *distanti* in Boulenger's (1915c, p. 616) key. In the present chaotic condition of this group of snakes it appears advisable to let Boulenger's identification stand until such time as a general revision of the genus is undertaken.

Leptotyphlops longicauda (Peters)

Stenostoma longicaudum Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 621: Tete, Mozambique.
Glauconia emini Loveridge (not of Boulenger), 1923e, p. 874.

2 (M.C.Z. 51038–9) near Tete. 12.i.49.

Records. Kotakota (L). This is based on a British Museum specimen that in 1923 was labeled "*emini*", and whose label, since amended, I misread and listed (1923e, p. 874) as KosaKola. Last year through the courtesy of Dr. H. W. Parker I was able to re-examine the snake and note that, in addition to a largish supraocular, its diameter of 2 mm. is included in its length of 115 (103 + 12) mm., 57.5 times.

Native name of the Long-tailed Worm-Snake. *Nyakarukukutwe* (Nyungwe; furnished me by a knowledgable African named John Simbi, but *before* a specimen was secured).

Variation. Midbody scale-rows 14; diameter into total length 62–74.6 times; tail into total length 6.6–8.3 times.

Size. Presumed ♂, 186 (158 + 28) mm.; presumed ♀, 224 (200 + 24) mm.

Habits. Found crawling on the surface according to the captor, then presumably driven up by ants as the temperature was 90° at the time.

BOIDAE

Python sebae (Gmelin)

Coluber sebae Gmelin, 1788, Syst. Nat. (ed. 13), p. 1118: America (*errore*).
Python sebae Boulenger, 1897e, p. 800; Johnston, 1897, pp. 359, 362; 1898, pp. 359, 361a; Duff, 1906, p. 138; Mitchell, 1946, p. 42.

Head (A.M.N.H. 67786) Chibotela. 24.viii–8.ix.46.

♀ (M.C.Z. 51040) Chipoka, Lake Nyasa. 7.iii.49.

Records. Karonga to Kondowe (B); Lake Nyasa (D). Doubtless further localities are mentioned in other popular accounts of Nyasaland. Mr. B. L. Mitchell informs me that pythons occur at Chikwawa; Chiromo; Chitala; Fort Johnston; Lake Chilwa; Monkey Bay; Port Herald; and Zomba.

Native name of Rock Python. *Satu* (Yao). Mitchell records *nsato* as common to four Nyasa tribes.

Variation. Midbody scale-rows 93; ventrals 270; subcaudals 76;

labials 13–14, the first two deeply pitted, the third only slightly.

Size. ♀, 1732 (1510 + 222) mm. Johnston mentions measuring one 18 feet, 2 inches long.

Habitat. Shot by P. Joubert at Dally's Hotel on the lakeshore south of Mtimbuka. North of Mtimbuka I came on a slough, but never saw a live python during the eight months spent in the Nyasaland bush!

Folklore. An old woman visited my camp near Tete with a string of python vertebrae wound around her skinny neck. When I enquired whether she wore them as an ornament or for some other reason, she said that they strengthened the throat and to make her meaning clearer, emitted a couple of coughs. Later from beneath her only garment she produced a belt of vertebrae she was wearing about her waist "to strengthen the stomach," i.e. as an antidote to age's digestive difficulties. Her philosophy appeared to have a more rational basis than that indicated on a python-vertebrae necklet from Lagos, Nigeria, that I saw in the Pitt Rivers Museum in Oxford. Its label states: "worn as a charm against snakebite."

COLUBRIDAE

NATRICITERES gen. nov.

1854. *Coronella* Peters (not of Laurenti, 1768, whose genotype was designated as *lacvis* by Boie, 1827), Monatsb. Akad. Wiss. Berlin, p. 622.

1861a. *Mizodon* (*sic*) Peters (not *Meizodon* of Fischer, 1856b, whose genotype is *regularis* = *M. coronata* [Schlegel]), Monatsb. Akad. Wiss. Berlin, p. 358.

1863. *Enicognathus* Jan (part; the genotype being here restricted to *occipitalis* Jan, 1863, currently referred to *Liophis*), Arch. Zool. Anat. Fisiol., **2**, p. 266.

1877c. *Neusterophis* Peters (not of Günther, 1863, whose genotype is *Natrix lacvissimus* Günther, a species referable to *Lycodonomorphus*), Monatsb. Akad. Wiss. Berlin, p. 614.

1884a. *Zacholus* Rochebrune (not of Wagler, 1830, whose genotype is *Coronella austriaca* Laurenti), Faune de la Senegambié. Reptiles, p. 156.

1886. *Grayia* Dollo (not of Günther, 1858, whose genotype was *Grayia silurophaga* Günther = *smythii* [Leach]), Bull. Mus. Hist. Nat. Belgique, **4**, p. 158.

1893b. *Tropidonotus* Boulenger (part; not of Kuhl, 1824, whose genotype is *tigrinus* Boie, 1826, currently referred to *Natrix*), Cat. Snakes Brit. Mus., **1**, p. 192.

1923. *Natrix* Schmidt (not of Laurenti, 1768, whose genotype is *vulgaris* Laurenti = *natrix* [Linné]), Bull. Am. Mus. Nat. Hist., **49**, p. 58.

Remarks. As will be seen from the foregoing synonymy, the group of five snakes comprising this genus has been assigned variously to seven different genera during the past century. More recently Bogert (1940, pp. 33–36) pointed out that these snakes consistently differed from the keeled-scaled African *Natrix* in a number of characters (italicised in the following description). He therefore revived the name *Neusterophis* for this homogeneous group, but *Neusterophis*, as shown later in this paper, is a straight synonym of *Lycodonomorphus*. No other name being available, I propose *Natriciteres* (♀ *Natrix* + *teres* = smooth, which has been suggested by Mr. Russell Olsen).

Genotype. Coronella olivacea Peters, 1854.

Description. Maxillary teeth 23–25, the anterior ones subequal, the last 3 or 4 sharply increasing in size; mandibular teeth slightly increasing in size towards middle of the jaw, decreasing posteriorly. Head slightly distinct from neck; eye moderate, with round pupil; nasal divided; a loreal; preoculars 1–2. Body cylindrical; scales *smooth, without apical pits*, in 15–19 rows; ventrals rounded. Tail moderate, tapering when intact; anal divided or entire; subcaudals in two rows. Hemipenis of male *basally bifid, exhibiting a short secondary lobe.*

Additional characters common to the five members of the genus here recognized result from a thorough study of the ample material in the Museum of Comparative Zoology and all known literature up to 1950. Only obvious misprints or miscounts have been omitted from the tabulation and key following.

Rostral broader than deep, visible from above; nostril between two nasals or separated from the posterior one by a narrow rim; internasals more or less narrowly truncate anteriorly, about as long as broad, slightly shorter than, or as long as, the prefrontals; frontal (in the middle) 1⅔ to 2 (2 1/3 occasionally in *o. olivacea*) times as long as broad, longer than its distance from the end of the snout, shorter than the parietals; loreal about as long as deep.

In the following tabulation the forms are arranged according to maximum size which shows some correlation with increase in the number of ventrals and subcaudals. WARNING. Many low subcaudal counts (including some of my own) occurring in the literature, are based on individuals with abbreviated *tails whose pointed terminal tips have been regenerated.* Sometimes these are so astonishingly like the original as to have deceived distinguished herpetologists into describing as new species examples of such short-tailed snakes. The matter is complicated by the high percentage (varying from locality

to locality but possibly 30 to 50 percent) of adult snakes that have lost their tails to predators, as can be seen by comparison with the tails of young specimens.

VARIATION IN LEPIDOSIS OF THE SPECIES OF *NATRICITERES* AS OF 1950

Species or race	*Ventrals*	*Anals*	*Subcaudals*	*Maximum length of*		*Maximum length of*	
				♂ *H.& B.*	♂ *Tail*	♀ *H.& B.*	♀ *Tail*
o. pembana	123–127	2	52–61	200 mm.	78 mm.	210 mm.	75 mm.
variegata	124–135	2	64–78	265 mm.	135 mm.	240 mm.	101 mm.
o. uluguruensis	125–144	2	62–84	300 mm.	130 mm.	350 mm.	140 mm.
o. olivacea	128–149	2	[1]57–87	332 mm.	132 mm.	460 mm.	[2]144 mm.
fuliginoides	122–135	1	75–95	370 mm.	[2]186 mm.	310 mm.	?

[1] Possibly, though questionably, the tail of an M.C.Z. snake with 51 subcaudals is intact.
[2] The tail measurements in these two instances are not those of the same snakes as those from which the head and body measurements are taken.

Species or race	*Pre-ocular*	*Post-oculars*	*Temporals*	*Upper Labials*	*Lower Labials*	*Midbody Scale-rows*
o. pembana	1–2	3	1+2	8	8	(15)17
variegata	1–2	(2)3	1+2	(7)8	8–9	(13)15
o. uluguruensis	1(2)	(2)3	(1+1)1+2(2+1)	8(9)	8–10	(15)17(19)
o. olivacea	1(2)	(1)(2)3	(1+1)1+2(1+3)	(7)8(9)	8–10	(17)(18)19
fuliginoides	1–2	(2)3	(1+1)1+2(0+2)	(7)8	8–10	17

Parentheses have been used in the preceding tabulation to indicate unusual variations detected during the examination of over 200 snakes.

Key to the Species and Subspecies of Natriciteres

1. Anal divided 2
   Anal entire 5
2. Midbody scale-rows 19 (rarely 17 or 18); range: swampy lowlands of Anglo-Egyptian Sudan east to extreme southern Somalia, south to Southern Rhodesia (the solitary Salisbury record of 1898), northeast

through Angola and the Belgian Congo to the Gold Coast (a Lagos specimen in the M.C.Z.) ..... *o. olivacea*
Midbody scale-rows 17 or less (rarely 18 or 19) 3

3. Midbody scale-rows 17 (very rarely 13\15, 18 or 19); range: montane marshes and forest fringes of East Africa from Tanganyika Territory south through Mozambique, Nyasaland, and Northern Rhodesia to Southern Rhodesia (Mount Selinda) and western Angola ..... *o. uluguruensis*
Midbody scale-rows 15 (occasionally 13 or 17) 4

4. Subcaudals 52–61; range: an insular form found only on Pemba Island, north of Zanzibar Island ..... *o. pembana*
Subcaudals 64–78; range: French Cameroon west to French Guinea ..... *variegata*

5. Subcaudals 75–95; midbody scale-rows invariably 17 coupled with a single anal; range: Belgian Congo northwest to French Guinea ..... *fuliginoides*

It will be noted that these last two species have almost coextensive ranges and occur in the same localities. In color and pattern they are indistinguishable, a conspicuous light nuchal collar being present in both, yet they appear to be distinct species.

Natriciteres olivacea olivacea (Peters)

Coronella olivacea Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 622: Tete, Mozambique.

Tropidonotus olivaceus Boulenger (part), 1893b, p. 227; 1896d, p. 604; 1897e, p. 800; Johnston, 1898, p. 361a.

5 ♂♂, 2 ♀♀ (M.C.Z. 51041–7) Mtimbuka. 14–19.ii.49.

Records. Karonga to Kondowe (B); Nkata Bay to Ruarwe (B); "Nyika Plateau" (B). For other Nyasaland records see subspecies below.

Native name of Olive Marsh-Snake. *Mbura* (Yao).

Variation. Midbody scale-rows 19; ventrals 134–138; anals 2; subcaudals 57–62; labials 8, fourth and fifth entering the orbit; lower labials in contact with the anterior sublinguals 5–6; preoculars 1–2; postoculars 2–3.

Color. All exhibit a broad, dark, vertebral band; both olive and rosy varieties were collected on the same day following heavy showers. Drought conditions prevented my meeting with the species at Tete.

Size. Largest ♂ (M.C.Z. 51042), 419 (317 + 102) mm.; the smallest a ♀ (taken February 19), measured only 165 (125 + 40) mm. in the field.

Parasites. Cestoda and Pentastomida (U.S.N.M. 47029).

Natriciteres olivacea uluguruensis (Loveridge)

Coronella olivacea var. *dumerilii* Günther, 1894a (1893), p. 618; Johnston, 1897, p. 362; 1898, p. 361a.

Tropidonotus olivaceus Boulenger (part), 1896d, p. 604; 1897e, p. 800; Johnston, 1898, p. 361a.

Natrix olivacea uluguruensis Loveridge, 1935, Bull. Mus. Comp. Zool., **79**, p. 7: Nyange, Uluguru Mountains, Tanganyika Territory.

♂ (M.C.Z. 51048) Cholo Mtn. 17.iii.49.

Records. Mlanje (as Milangi; B); "Zomba" (B). The Montane Marsh-Snake, a forest-fringe form already recorded from Rungwe Mountain by Bogert (1940, p. 35), and ranging as far south as Chirinda Forest, Selinda Mountain, Southern Rhodesia, where three were taken by FitzSimons (1939b, p. 20), though not recorded under this name.

To this race I would also refer the four snakes from Massangulo, Portuguese Niassa (13° 55′ S., 35° 35′ E., Alt. 3375 feet, so apparently in the Mtonia Mountains) referred to "*Tropidonotus* sp." and to the West African "*Tropidonotus fuliginoides*" by Cunha (1935 & 1937). Through the courtesy of Dr. A. A. Themido I have been enabled to examine one of these snakes which is a typical *uluguruensis* with divided anal.

Variation. Midbody scale-rows 17; in all other respects within the range of the typical lowland form.

Enemies. The tail of a Montane Marsh-Snake was disgorged by a Cape File-Snake (*Mehelya c. capensis*) which I captured near Lujeri River, Mlanje Mountain.

Genus Lycodonomorphus

1843 *Lycodonomorphus* Fitzinger, Systema Reptilium, p. 27: genotype: *Coronella rufula* Schlegel = *Coluber rufulus* Lichtenstein.

1848. *Lycodontomorphus* Agassiz, Nomen. Zool. Index Universalis, p. 628: emend. pro *Lycodonomorphus* Fitzinger, 1843.

1860. *Lycodonomorphus* Fitzinger, Sitzungsber. Kais. Akad. Wiss. (Wien), **42**, p. 408: genotype: *Coluber rufulus* Lichtenstein.

1863. *Neusterophis* Günther, Proc. Zool. Soc. London, p. 16, footnote: genotype: *Natrix lacvissima* Günther.

1893b. *Ablabophis* Boulenger, Cat. Snakes Brit. Mus., **1**, p. 318: genotype: *Coluber rufulus* Lichtenstein.

Remarks. Over forty years ago Hewitt (1912, p. 267) pointed out the close affinities of *Ablabophis rufulus* and *Tropidonotus laevissimus* in respect to their dentition. In the number of their pterygoid teeth he found the former had about 34, the latter 30, as against the 16 attributed to *Natrix n. natrix.* Maxillary teeth in *rufulus* were said to be equal and number 20–25 by Boulenger; in *laevissimus* Hewitt found 25, subequal throughout except for a very slight reduction in size posteriorly. Mandibular teeth in *rufulus* and *laevissimus* are longest anteriorly and indistinguishable.

Hewitt concluded that the shape of the pupil was the sole character of generic status separating the two species and questioned whether this was sufficient; nevertheless, for a quarter-century he has continued to treat the two reptiles as generically distinct. While the pupil may be regarded as subcircular or subelliptic in most of the nine *rufulus* in the Museum of Comparative Zoology's collection, it appears to be round in others (M.C.Z. 21306; 21476 for e.g.) as it is in all our *laevissimus.*

More recently Bogert (1940, pp. 5, 11, 18, 32–36) approached the status of African ophidian genera on the basis of their hemipenal characters as well as dentition. He decided to separate *laevissimus, olivaceus, fuliginoides,* and other smooth-scaled African "*Natrix*" under the name *Neusterophis.* Unfortunately the type species *laevissimus* has the sulcus spermaticus forked, while in *olivaceus* and *fuliginoides* it is not forked.

Lycodonomorphus rufulus mlanjensis subsp. nov.

Type. M.C.Z. No. 51050, an adult male from Ruo River, Mlanje Mountain, Nyasaland. Collected by Arthur Loveridge, April 1, 1949.

Paratypes. M.C.Z. Nos. 51049 and a duplicate now in British Museum (N.H.), being two males from a stream near Nswadzi River, Cholo Mountain, Nyasaland. Collected on 16 and 22, April, 1949. Also an adult female (British Museum, No. 34.2.1.27), from Zomba, Nyasaland.

Diagnosis. Though *L. r. rufulus* is a common South African snake of which many specimens have been collected, only two examples with more than 19 midbody scale-rows have been recorded during the past 125 years. The new form is, therefore, distinguished from all other races of *rufulus,* except *L. r. leleupi* Laurent of the Belgian Congo, by its 21 midbody scale-rows, and in addition from *r. whytii,* the only

other race found north of the Zambezi, by its higher number of subcaudals. Its immaculate throat and belly immediately distinguish it from adults of *L. r. lelenpi* and *L. laevissimus* of South Africa, the only other species in the genus.

Description. Rostral broader than deep, just visible from above; nostril between two nasals, directed upwards; internasals (as long as or) longer than broad, slightly shorter than the prefrontals; prefrontals large, squarish; frontal 1½ (1⅓ to 1 ⅔) times as long as broad, (as long as) or longer than its distance from the end of the snout, shorter than the parietals; loreal longer than deep, well separated from the first labial; preocular 1; postoculars 2; temporals 1 + 2; upper labials 8, fourth and fifth entering the orbit; lower labials 8, first four in contact with the anterior sublinguals, which are subequal to the posterior. Midbody scale-rows 21; ventrals (163–) 167 (169 in ♀ paratype); anal entire; subcaudals 71 (51 in ♀ paratype; 60 & 66 in the paratype ♂♂ whose tail-tips may possibly be missing).

Color. Above, glossy black; upper and lower lips white, the upper heavily infuscated, the lower only anteriorly so; the lowest scale-row and edges of the next one above it whitish, more or less obscured by dusky infuscations. Below, faintly pinkish white; throat to anus immaculate except for tiny flecks on three ventrals; tail with a dark median line formed of dusky spots (ending an inch from the tip in one paratype).

Size. Total length of type ♂ (M.C.Z. 51050), 735 (550 + 180) mm., of paratype ♂♂, 516 (405 + 111) mm., and 479 (377 + 102) mm., the tails being .24 per cent, .21 per cent and .21 per cent of their respective total lengths.

Diet. A large ranid tadpole in the stomach of the type.

Parasites. Nematode worms (*Kalicephalus* sp.; immature Ascaridae; also larval Anisakinae, probably *Cleoascaris* sp.) were abundant in the type.

Temperament. Even Africans appear to recognize the docility of this species as will be seen from remarks under habitat.

Native name of the Mlanje Water-Snake. *Chirumi* (Manganja).

Habitat. Immediately after more than forty hours incessant rain, a small boy named Harry arrived in camp with the first snake (M.C.Z. 51049) which, quite unharmed, he had confined in a receptacle made of banana stem. He said he had caught the reptile in a small stream that flows into the Nswadzi River about three miles north of my camp (Cholo Mtn., 16.iii.49).

As Harry failed to return, though I had urged him to try and obtain further specimens, I set out to find the place from which the snake had come. A friend of Harry's conducted me to the precise spot on Muyenda stream where they had found it. The shallow, ankle-deep stream was flowing among numerous well-rounded stones between almost vertical banks varying in height from four to six feet. Two men who said they were familiar with the ways of *chirumi*, appeared from nearby huts and began groping for the snakes beneath the stones in much the same way as one would tickle for trout. In this fashion, with Thomas and I following at their heels, we worked upstream for a hundred yards turning every movable boulder but without result.

Half-a-dozen small boys "assisted", while from the bank above as many little girls with sparkling eyes watched us. One three-year-old started to run each time I happened to look in her direction, then broke into peals of laughter. When we abandoned our fruitless search and toiled back up the steep path that led past the half-dozen huts, one of which was Harry's home, two toddlers on the mud "veranda" of a hut fled, one infant crying at the sight of this apparition. At such childishness the three-year-old, now following at my heels, laughed scornfully. (Muyenda Stream, 21.iii.49).

Lycodonomorphus rufulus whytii (Boulenger)

Glypholycus whytii Boulenger, 1897c, Proc. Zool. Soc. London, pp. 800, 802, pl. xlvi, fig. 2: Fort Hill, 4000 feet, Nyasaland. Johnston, 1898, p. 361a; Boulenger, 1915c, p. 619; Werner, 1929a, p. 50.

Records. When passing through Fort Hill we made enquiries regarding this Whyte's Water-Snake, of which the female type is still the only known Nyasaland example. Conditions at Fort Hill may have been different in Whyte's time, but today its arid surroundings appeared an unlikely place in which to find such a water-loving species. One wonders whether the type could possibly have come from the not too distant Misuku Mountains where streams were formerly plentiful and suitable habitats for a montane-torrent snake still to be found.

I am informed by Dr. A. A. Themido that the two snakes from Massangulo, Portuguese Nyasaland, recorded as *Ablabophis rufulus* by Cunha (1935, p. 5), were actually *Boaedon l. lineatus*. The scale counts furnished by Cunha are not those of his specimens but were taken from Boulenger's (1893b, p. 318) catalogue. *Ablabophis whytii* was found at Charre, Mozambique, by Cott (1935, p. 965), and

recorded from Rungwe Mountain, to the north of Fort Hill, by Bogert (1940, p. 18). Unfortunately *Ablabophis* Boulenger (1893b) is antedated by *Lycodonomorphus* Fitzinger (1843) for both designated *Coluber rufulus* Lichtenstein (1823) as genotype.

Boaedon lineatus lineatus Duméril & Bibron

Boaedon lineatum Duméril et Bibron, 1854, Erpét. Gén., **7**, p. 363: Gold Coast.
Boodon lineatus Günther, 1893 (1892), p. 555; Boulenger, 1893b, p. 332; 1896d, p. 616; 1897e, p. 801; Johnston, 1897, p. 362; 1898, p. 361a.
Boaedon lineatus lineatus Bogert, 1940, p. 21.

♂, 4 ♀ ♀ (A.M.N.H. 67744–8) Nchisi Mtn. vii–ix.46.
♂ (A.M.N.H. 67741) Zomba Plateau. v–vi.46.
♂ (A.M.N.H. 67756) Likabula River. vi–vii.46.
2 ♀ ♀ (M.C.Z. 51051–2) Misuku Mtns. 4.x.48.
♂ (M.C.Z. 51053) Nyika Plateau. 15.xi.48.
♂ (M.C.Z. 51054) Nchenachena. 20.x.48.
♂ (M.C.Z. 51055) Vipya Plateau. 17.ix.48.
2 ♂♂, 5 ♀ ♀ (M.C.Z. 51056–60) Nchisi Mtn. xi–xii.48.
♀ juv. (M.C.Z. 51061) Chitala River. 14.xii.48.
3 ♂♂, 3 ♀ ♀ (M.C.Z. 51062–7) Mtimbuka. 11–28.ii.49.
2 ♀ ♀ juv. (M.C.Z. 51068–9) Lake Malombe. 25.ii.49.
♂ (M.C.Z. 51070) Zomba Plateau. 2.ix.48.
♂ ♀ (M.C.Z. 51071–2) Likabula River. 5–6.viii.48.
3 ♂♂, 3 ♀ ♀ (M.C.Z. 51073–8) Ruo River. 1–8.iv.49.
7 ♂♂, 4 ♀ ♀ (M.C.Z. 51080–90) Cholo Mtn. 11–25.iii.49.
♂, 2 ♀ ♀ (M.C.Z. 51091–3) near Tete. 13.i.49.
♂ (M.C.Z. 51094) Beira. 17.vii.48.

Records. Blantyre (B); Fort Hill (B); Karonga (Bogert); Karonga to Kondowe (B); Mlanje (Bogert); Nkata to Ruarwe (B); "Nyika Plateau" (B); Shire Valley (G); Zomba (B). In addition to some of the foregoing localities Mr. Mitchell informs me he has taken this species at Fort Johnston.

Native names of the Brown House-Snake. *Chakusa* (Nyanja); *chigonakusa* (Manganja); *kajengamauta*! (Yao); *mburu* (Chewa & Ngoni). Unfortunately this useful reptile, especially in its blackish phases, is commonly supposed by both Africans and Europeans to be the young of cobra or mamba, the Misuku assuring me that *swera* was the correct name and some Nyanja mistakenly calling it *mamba*.

Variation. Midbody scale-rows 25–33 (usually 27–29, for only eight of the fifty-four snakes possess 25 (2), 31 (5), or 33 (1); ventrals

199–227 (see below for sexual differences); anal entire; subcaudals 44–67; upper labials 8, the fourth and fifth, or third, fourth and fifth (in two snakes only) entering the orbit; lower labials 8–10, the first 2–5 (usually 4) in contact with the anterior sublinguals; loreal 1; preocular 1 (43 sides) or 2 (61 sides), the former condition being usual on Zomba and Mlanje snakes, the latter (*bipraeocularis* Günther) normal for those from Mtimbuka and Cholo; temporals 1 + 2, except on one side of four snakes which have 1 + 3.

Size. Largest ♂ (M.C.Z. 51070), 708 (590 + 118) mm.; largest ♀ (M.C.Z. 51051), 927 (810 + 117) mm.

Sexual dimorphism. The following extremes of range have been subjected to very careful rechecking:

In 19 males the range of ventrals is 199–211; of subcaudals 55–67; and the tail is .14 (1 ex.) to .18 (1 ex.) per cent of *total* length.

In 23 females the range of ventrals is 214–227; of subcaudals 44–55; and the tail is .11 to .12 per cent of *total* length.

Breeding. The only females with developing eggs were taken: On August 5, at Likabula River, a ♀ held 6 eggs measuring 10 x 5 mm. On October 10, in the Misukus, a ♀ held 14 eggs measuring 13 x 7 mm.

Diet. A mouse (*Leggada triton murilla* in stomach of an Nchisi snake; the undigested hind half of a reddish brown *Pelomys*-like *rumbi* rat (*Lemniscomys griselda calidior*) at Likabula; a gecko (*Hemidactylus mercatorius*) and its separated tail in a Kasumbadedza snake. Stomachs empty in remaining 49 snakes!

Parasites. Roundworms (*Kalicephalus* sp.; *Ophidascaris* sp.) were present in the stomachs of snakes from the Misuku, Nyika, and Nchisi Mountains. Tapeworms (U.S.N.M. 41282, 41285) in those from the Misuku Mountains and Likabula River.

Enemies. Of these 52 snakes, 6 ♂♂ and 4 ♀♀ had lost the tips of their tails previous to capture.

Aestivation? It seems more than a coincidence that during the hot weather in the lowlands, i.e. mid-December to mid-March, only juvenile house snakes (with overall measurements ranging from 242 to 272 mm.) were encountered. Possibly unappeased hunger in the young causes them to be more active at such times. After three days heavy rain on the Ruo River, two fine adult males with empty stomachs were brought in.

Habits. It is their search for rodents that induces hungry house snakes to frequent buildings, where their climbing prowess occasionally lands them in unexpected places. At Mtimbuka as I took hold of the

bathroom door late one night, I felt something soft squirm beneath my grasp, a light revealed it as the tail and posterior portion of an eighteen-inch house snake whose body lay along the lock while the head was searching for an exit between the ill-fitting door and its frame.

Lycophidion capense capense (Smith)

Lycodon capensis A. Smith, 1831, S. African Quart. Journ., **1**, p. 18: Kurrichane, *i.e.* Rustenberg District, Transvaal.
Lycophidium horstockii Günther, 1893 (1892), p. 555: Johnston, 1897, p. 362; 1898, p. 361a.
Lycophidium capense Boulenger, 1893b, p. 339; 1896d, p. 616.
Lycophidion capense capense Bogert, 1940, p. 30.

♀ (A.M.N.H. 67793) Kotakota. viii–x .46.
♀ (M.C.Z. 51095) Cholo Mtn. 21.iii.49.

Records. Mlanje Mtn. (Bogert); Shire Highlands (G); Zomba (B).

Variation. Midbody scale-rows 17; ventrals 190–198; anal 1; subcaudals 31–39; labials 8, the third, fourth and fifth entering the orbit; lower labials 8, the first 5 in contact with an anterior sublingual; preocular 1; postoculars 2; temporals 1 + 2.

Color. Throat of Cholo snake white, less so in the Kotakota specimen; ventrals plumbeous more (anteriorly) or less (posteriorly) edged with white.

Size. Larger ♀ (A.M.N.H. 67793), 457 (415 + 42) mm.

Diet. A skink (*Mabuya v. varia*) recovered from the stomach of the Cholo snake. In view of the abundance of this skink throughout Nyasaland, the scarcity (as shown by my securing only one in eight months) of *L. c. capense* is surprising, for the reptile is abundant in Tanganyika Territory.

Mehelya capensis capensis (Smith)

Heterolepis capensis A. Smith, 1847, Illus. Zool. S. Africa, pl. lv: Eastern districts of Cape Colony.
Simocephalus capensis Boulenger, 1896d, p. 617.
Mehelya capensis capensis Loveridge, 1939c, p. 142 (generic revision).

♂ (M.C.Z. 51096) Mtimbuka. 4.iii.49.
♂ (M.C.Z. 51097) Lujeri River. 2.iv.49.

Records. Zomba (B).

Native name of Cape File-Snake. *Gulambila* (Yao, but generic); *nyoka ndalu* (Nyanja on Mlanje).

Variation. Midbody scale-rows 15; ventrals 211–220; anal 1; subcaudals 56–58; upper labials 6–7, the third and fourth entering the orbit; lower labials 8, the first four in contact with an anterior sublingual; loreal 1; preocular 1; postoculars 2; temporals 1 + 2.

Color. It is interesting to note that the ground color of both these *young* males approaches that of *nyassae* except for the pure white vertebrals, being black above, but pure white below.

Size. Larger ♂ (M.C.Z. 51096), measures 573 (500 + 73) mm.

Diet. The tail of a young sand snake (*Psammophis s. sudanensis*) was present in the stomach of the Mtimbuka snake, while the Lujeri reptile disgorged the tail of a Montane Marsh-Snake (*Natriciteres o. ulugurucnsis*) when handled.

Temperament. The Lujeri snake was lying coiled beneath an uprooted stump close to the river. When I picked it up it made no attempt to bite, but flattened its throat slightly and disgorged the tail as related above.

Mehelya nyassae (Günther)

Simocephalus nyassae Günther, 1888b, Ann. Mag. Nat. Hist. (6), **1**, p. 328: Lake Nyasa, Nyasaland. Boulenger, 1891a, p. 306; 1893b, p. 347, pl. xxiii, fig. 2; Sternfeld. 1910a, p. 17.

Mehelya nyassae Loveridge, 1939c, p. 148 (generic revision).

♂ ♀ (M.C.Z. 51098–9) Mtimbuka, L. Nyasa. 9–10.ii.49.

Records. Lake Nyasa (G).

Native name of Nyasa File-Snake. *Gulambila* (Yao, but generic).

Variation. Midbody scale-rows 15; ventrals 173–174; anal 1; subcaudals 71–68+ (tip missing); upper labials 6, third and fourth entering the orbit; lower labials 7, the first five in contact with an anterior sublingual; loreal 1; preocular 1; postocular 1; temporals 1 + 2.

The previous recorded range for subcaudals was 55–63, but at the time my (1939c, p. 148) revision was published only seven specimens were known, possibly all females, though one of Werner's types of *Gonionotophis degrijsi* was said to be a male.

Color. Above, uniform black; below, brownish black, each ventral edged with lighter.

Size. Total length of ♂, 401 (390 + 111) mm.; of ♀ 464+ (360 + 103+) mm., tail-tip missing.

Philothamnus hoplogaster (Günther)

Ahaetulla hoplogaster Günther, 1863, Ann. Mag. Nat. Hist. (3), **11**, p. 286: "Port Natal," i.e. Durban, Natal, Union of South Africa.

Philothamnus neglectus Peters, 1866, Monatsb. Akad. Wiss. Berlin, p. 890: Praso Boror, Mozambique.

Ahaetulla neglecta Günther, 1894a (1893), pp. 618, 620; Johnston, 1897, p. 362; 1898, p. 361a.

Chlorophis hoplogaster Boulenger (part), 1894a, p. 93; Bogert (part), 1940, p. 54.

Chlorophis neglectus Boulenger (part), 1894a, p. 94; 1896d, p. 361.

♂♂ (M.C.Z. 51101–2) Misuku Mtns. 6.x.48.
♂ (M.C.Z. headless) Nchenachena. 20.xi.48.
♂ (M.C.Z. 51103) Nchisi Mtns. 10.xii.48.
♀ (M.C.Z. 51104) Chitala River. 18.xii.48.
♂ (M.C.Z. 51105) Chowe. 12.ii.49.
♀ (M.C.Z. 51106) Zomba Mtn. 7.ix.48.
♀ (M.C.Z. 51107) Cholo Mtn. 23.iii.49.
♀ (M.C.Z. 51108) Ruo River. 4.iv.49.

Records. Occurs with *irregularis* at Misuku; Nchenachena; Nchisi; Cholo and Ruo River, Mlanje Mtn. Blantyre (also Mandala Hill; B); Karonga (Bogert); Mlanje Mtn. (G.; B); Shire Highlands (G.; B); Zomba (G.; B).

Native names of Southeastern Green-Snake. *Nalwinduwindu* (Misuku); *namasamba* (Nyanja, but not even generic); *nyoka msipu* (Chewa; Ngoni).

Variation. Midbody scale-rows 15; ventrals 145–158; anals 2; subcaudals 80–92; upper labials 8, rarely 7 or 9, the fourth and fifth, rarely the third and fourth (M.C.Z. 51107), or fifth and sixth (left side only of M.C.Z. 51102) entering the orbit; lower labials 9–11, the first four, five or six in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 1 + 1, or 1 + 0 (in M.C.Z. 51004 only, where the seventh labial is in contact with the parietal on both sides).

Color. On the nape and anterior part of the back of both a ♂ hatchling (ex. Chowe) and ♂ adult (ex. Misuku) are a dozen pairs of jet black spots, or crossbars formed by the coalescence of a pair of spots, set off handsomely by the rich velvety green ground color.

Size. Largest ♂ (M.C.Z. 51101), 720 (500 + 220) mm.; ♀ (M.C.Z. 51106), 616 (465 + 151) mm.; hatchling ♂ (M.C.Z. 51105), 193 (140 + 53) mm.

Breeding. On December 18, at Chitala, a ♀ held 6 eggs measuring

20 x 28 mm. On February 12, at Chowe, a hatchling measured 3 mm. longer than it now does in alcohol (*vide supra*).

Enemies. A ♀, with only a stump of tail left, was brought to me on our fourteenth day on Cholo Mountain, evidence of the relative rarity of this species there as compared with *irregularis*. It also happened to be the fourteenth species of snake obtained during our fortnight on Cholo.

Habits. A ♂ was basking on a sunlit patch of leaf-strewn ground fifty feet or so inside the forest fringe. It darted downhill and then ascended a sapling where I shot it.

Philothamnus irregularis irregularis (Leach)

Coluber irregularis Leach, 1819, in Bowdich, Mission to Ashantee, p. 494: Ashanti, Gold Coast.

Ahaetulla shirana Günther, 1888b, Ann. Mag. Nat. Hist. (6), **1**, p. 326: Blantyre Mission, Shire River, Nyasaland.

Chlorophis irregularis Boulenger, 1891a, p. 306; 1894a, p. 96; 1896d, p. 631; 1897e, p. 801; Johnston, 1898, p. 361a; Bogert, 1940, p. 53.

Ahaetulla irregularis Günther, 1893 (1892), p. 555; Johnston, 1897, p. 362; 1898, p. 361a.

2 ♂♂, 1 ♀ (A.M.N.H. 67752–4) Nchisi Mtn. 23.vii–13.ix.46.
1 ♂, 3 ♀♀ (A.M.N.H. 67787–90) Cholo Mtn. 18.ix–1.x.46.
2 ♂♂, 1 ♀ (A.M.N.H. 67765–7) Likabula R. 19.vi–18.vii.46.
1 ♂, 3 ♀♀ (M.C.Z. 51009–12) Misuku Mtns. 9–14.x.48.
♂ (M.C.Z. 51113) Nchenachena. 20.xi.48.
2 ♀♀ (M.C.Z. 51114–5) Mtimbuka. 12–15.ii.49.
♂ (M.C.Z. 51116) Chiradzulu Mtn. 31.viii.48.
♀ (M.C.Z. 51117) Limbe. 16.iv.49.
2 ♂♂, 6 ♀♀ (M.C.Z. 51118–25) Cholo Mtn. 11–26.iii.49.
3 ♂♂, 1 ♀ (M.C.Z. 51126–9) Ruo River. 1–9.iv.49.

Records. Occurs with *hoplogaster* at Misuku, Nchenachena; Nchisi; Cholo and Ruo River, Mlanje Mtn. Blantyre Mission (G); Blantyre (Mandala Hill; B); Fort Hill (B); Karonga to Kondowe (B); Mlanje Mtn. (B and Bogert); "Nyika Plateau" (B); Shire Valley (B).

Native names of Western Green-Snake. *Nalwinduwindu* (Misuku; but not even generic); *namasamba* (Manganja; Nyanja; Yao; but not even generic).

Variation. Midbody scale-rows 15; ventrals 152–163; anals 2, rarely 1 (M.C.Z. 51110 only); subcaudals 97–121; upper labials 9, rarely 8 or 10, the fourth, fifth and sixth, rarely the third, fourth and fifth; fifth

and sixth (A.M.N.H. 67766[1] and right side only of M.C.Z. 51125); or fifth, sixth and seventh, entering the orbit; lower labials 8–11 (usually 9–10), the first four, five or six in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 1 + 1 (35 sides), 1 + 2 (26 sides), or 1 + 0 (in M.C.Z. 51111 only, where the seventh labial is in contact with the parietal on both sides).

Color. On the nape and anterior part of the back of a young ♀ (ex. Mtimbuka) are faint indications of dark crossbars as in both *Philothamnus s. semivariegatus* and *P. hoplogaster.*

Size. Largest ♂ (M.C.Z. 51116), 1037 (700 + 337) mm.; ♀ (M.C.Z. 51120), 1080+(785 + 295+) mm., the next largest perfect ♀ (A.M.N.H. 67788) measuring 1059 (745 + 314) mm., the smallest ♀ (M.C.Z. 51115), 274 (196 + 78) mm.

Breeding. On September 30, on Misuku, a ♀ held 11 eggs measuring about 15 x 11 mm. On October 9, on Misuku, a ♀ held 7 eggs measuring 30 x 12 mm., and obviously ready for laying.

Diet. Two *Rana o. gribinguiensis* in two Cholo snakes; remains of a *Hyperolius* sp. in a Mtimbuka reptile.

Enemies. Two *irregularis* were recovered from the stomachs of *Thelotornis k. capensis* on Cholo Mountain.

Habits. The biggest male was found among recently scythed grass drying in hot sunshine on the slopes of Mount Chiradzulu. After being disturbed, the reptile dashed wildly hither and thither for some time before I managed to intercept and catch it.

Philothamnus semivariegatus semivariegatus (Smith)
Plate 4, figure 1

Dendrophis (*Philothamnus*) *semivariegata* A. Smith, 1840, Ill. Zool. S. Africa, Rept., pls. lix, lx, lxiv, figs. 1a–1b: Bushman Flat, Cape Province (restricted by Bogert, 1940, p. 56).

Philothamnus semivariegatus Boulenger, 1891a, p. 307; 1894a, p. 99; 1896d, p. 631; 1897e, p. 801; Johnston, 1898, p. 361a.

♀ (A.M.N.H. 67762) Likabula River. 19.vi–18.vii.46.
♀ (M.C.Z. 51130) Misuku Mountains. 14.x.48.
♂ (M.C.Z. 51131) Chitala River. 18.xii.48.
2 ♂♂, 1 ♀ (M.C.Z. 51132–4) near Tete. 10–22.i.49.

Records. Blantyre (B); Fort Hill (B); Karonga to Kondowe (B);

[1] Clearly not *hoplogaster* by its 119 subcaudals.

Lake Nyasa (B); "Nyika Plateau" (B); Shire River (B); Shire Valley (B).

Native names of Spotted Bush-Snake. *Changa* (Yao); *nyalwinduwindu* (Misuku, but not even generic); *nyoka masamba* (Nyungwe).

Variation. Midbody scale-rows 15; ventrals 169–196; anals 2; subcaudals 138–142+; upper labials 9, rarely 10, the fourth, fifth and sixth, or fifth and sixth only, or fifth, sixth and seventh entering the orbit; lower labials 9–10, the first four or five in contact with the anterior sublinguals; preocular 1, postoculars 2; temporals 1 + 1 (1 side), 1 + 2 (5 sides), or 2 + 2 (6 sides).

Size. Largest ♀ (M.C.Z. 51133), 1020 (720 + 300) mm.

Breeding. On October 14 in the Misuku Mtns. a ♀ held 5 eggs each measuring about 41 x 12 mm.

Diet. A Tete ♀ held the tails only of two large *Pachydactylus b. turneri*, the geckos themselves having escaped.

Defence. The fine Chitala ♂, captured alive, inflated its throat vertically as its photograph was being taken.

Meizodon semiornata (Peters)

Coronella semiornata Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 622: Mozambique. Boulenger, 1894a, p. 359.

Records. Lake Nyasa (B).

Remarks. Boulenger does not mention the collector of this specimen which has not been taken since in Nyasaland. It was Bogert (1940, p. 50) who pointed out that *Meizodon* Fischer, 1856, should be applied to the African snakes customarily referred to the European genus *Coronella*. *C. s.* var. *mossambicae* Cott, 1935 (1934) is a synonym.

Pseudaspis cana (Linné)

Coluber canus Linné, 1758, Syst. Nat. ed. 10, **1**, p. 221: "Indiis."
Pseudaspis canus Boulenger, 1896d, p. 620.

Records. Chiradzulu (B); Zomba (B).

Remarks. Not since Sir Harry Johnston secured the two male Mole Snakes listed above, does anyone seem to have collected further examples of this big snake in Nyasaland. I completely failed to do so though constantly on the lookout for it at Chiradzulu and Zomba.

Duberria lutrix shirana (Boulenger)

Homalosoma lutrix Günther (not Linné), 1893 (1892), p. 555; Johnston, 1897, p. 362; 1898, p. 361a.

Homalosoma shiranum Boulenger, 1894a, Cat. Snakes Brit. Mus., **2**, p. 276, pl. xiii, fig. 1: Shire Highlands, Nyasaland.

Duberria lutrix shiranum Loveridge (part), 1933h, pp. 241–244, and as *shirana*, 1942e, p. 281.

♀ (A.M.N.H. 67783) Lichenya Plateau. 24.vi–18.vii.46.
♂ (M.C.Z. 51135) Zomba Plateau. 4.ix.48.
2 ♂♂, 1 ♀ (M.C.Z. 51136–8) Nyika Plateau. 8–15.xi.48.

Records. As the Shire Highlands (G) was used chiefly for Zomba and Mlanje Mountains, the first two specimens are topotypic.

Variation. Midbody scale-rows 15; ventrals 128–137; anal 1; subcaudals 32–48; upper labials 6, the third and fourth entering the orbit; lower labials 6–7, the first three in contact with the sublinguals; no loreal; preocular 1; postocular 1 except for 2 on one side of one Nyika snake.

Color. Belly on one Nyika ♂ appears almost uniformly white, of the other Nyika ♂ largely black as in *atriventris* Sternfeld.

Size. Largest ♂ (M.C.Z. 51136), 310 (247 + 63) mm.; and ♀ (M.C.Z. 51137), 251 (300 + 51) mm.

Breeding. In early July a ♀ held 8 eggs measuring about 13 x 6.5 mm. On November 8 the other ♀ held 14 large ova or embryos.

Diet. A slug in one.

Habits. I took the gravid ♀ at 8 A.M. as she basked in weak sunshine, somewhat sheltered from a cold wind by the grassy tussock among whose stems she was entwined. The ♂♂ were taken on the same inhospitable plateau at 7000 feet at 7.50 and 10 A. M. respectively. The Zomba ♂ at noon among stones on the eroded hillside above the Governor's cottage.

Prosymna lineata (Peters)

Temnorhynchus lineatus Peters, 1871a, Monatsb. Akad. Wiss. Berlin, p. 568: Matlale, Gazaland, Mozambique.

1 (M.C.Z. 51144) Kasumbadedza near Tete. 18.i.49.

Remarks. Our specimen is only the third example of this distinctive species to be taken in eighty years. The second, from the port of

Angoche, was referred by Bocage (1882a) first to *frontalis*, and subsequently (1896a) to *sundevallii*. Though my tailless specimen is too damaged to provide accurate ventral counts, in all ascertainable respects it conforms to Peters' description of his type.

Enemies. The much-chewed remains of this large species were taken from the stomach of a topotypic Mozambique Genet (*Genetta t. mossambicus*) that I shot, shortly after sun-up, as it was basking high up in a big baobab.

Prosymna ambigua stuhlmanni (Pfeffer)

Prosymna ambigua Boulenger (not of Bocage), 1891a, p. 300; 1894a, p. 248.
Ligonirostra stuhlmanni Pfeffer, 1893, Jahrb. Hamburg. Wiss. Anst., **10**, p. 78, pl. i, figs. 8–10: Usambara, Tanganyika Territory.

2 ♂♂, 2 ♀♀ (M.C.Z. 51139–42) Mtimbuka. 8–26.ii.49.
♂ (M.C.Z. 51143) Kasumbadedza near Tete. 18.i.49.

Records. Shire Valley (B).

Native name of the East African Shovel-snout. *Tupilinongo* (Yao).

Variation. Midbody scale-rows 15; ventrals 138–154; anal entire; subcaudals 20–32; upper labials 6, the third and fourth entering the orbit.

Size. Largest ♀ (M.C.Z. 51141), 260 (238 + 22) mm.; largest ♂ (M.C.Z. 51143), 236 (202 + 34) mm.; hemipenis of a ♂ with a 31 mm. tail measured 28 mm. unstretched.

Breeding. On February 26, ova were not developed in an adult ♀.

Diet. One stomach held a young gecko (*Hemidactylus mercatorius*, possibly *mabouia*).

Habitat. One was found beneath a bundle of grass on the porch of a hut, another under a rotting log that harbored many small lizards.

Dasypeltis scaber scaber (Linné)

Coluber scaber Linné, 1758, Syst. Nat. ed. 10, **1**, p. 223: "Indiis."
Dasypeltis scabra Günther, 1894a (1893), pp. 618, 619; Boulenger (part), 1894a, p. 353; 1897e, p. 801; Johnston, 1897, p. 362; 1898, p. 361a.
Dasypeltis scaber var. *mossambicus* Peters, 1864a, Monatsb. Akad. Wiss. Berlin, p. 644, footnote: Boror and Tete, Mozambique.

♀ (M.C.Z. 51147) Cholo Mtn. 20.iii.49.
♂ ♀ (M.C.Z. 51145–6) near Tete. 8–28.i.49.

Records. Kotakota (in Brit. Mus.); "Nyika Plateau" (B); Shire Highlands (G); Zomba (B).

Remarks. The two snakes from Kasumbadedza are topotypes of *mossambicus* Peters, a synonym of the typical form which is largely associated with rivers and marshes. The Cholo snake came from about 4000 feet.

Native name of the Rhombic Egg-eater. It was given as *mberenga* (Nyungwe), presumably due to confusion with *Telescopus s. semiannulatus.*

Variation. Midbody scale-rows 25; ventrals 225–244; anal entire; subcaudals 59–62; upper labials 6–7, the second, third and fourth (unusual), third only (through fusion), or third and fourth (normal) entering the orbit; preocular 1; postoculars 0 (due to fusion with labial), 1 (unusual) or 2 (normal); temporals 2 + 3 and 2 + 4.

Diet. The stomach of the juvenile taken on January 8, was full of yolk. Nesting seasons of birds and the prolonged drought were probably responsible for six months elapsing before I obtained the first example of this common reptile.

Dasypeltis scaber palmarum (Leach)

Coluber Palmarum Leach, 1818, in Tuckey, Explor. River Zaire, App., p. 408: Embomma, i.e. Boma, Belgian Congo.
Dasypeltis scabra Boulenger (part), 1897e, p. 801.

Records. Fort Hill (B: as *scabra*).

Variation. A pair (♂ and ♀) from Fort Hill, which I examined at the British Museum, unquestionably belongs to this uniformly-colored montane forest race. Midbody scale-rows 24–25; ventrals 202–241; anal entire; subcaudals 57–67; upper labials 7, the third and fourth entering the orbit; preocular 1; postoculars 2; temporals 2 + 3.

Size. Length of ♂, 482 (389 + 93) mm.; of ♀, 755 (660 + 95) mm.

Dasypeltis scaber medici (Bianconi)

Dipsas medici Bianconi, 1859, Mem. Accad. Sci. Bologna, **10**, p. 501, pl. xxvi: Mozambique.
Dasypeltis scabra Günther (part), 1894a (1893) pp. 618, 619. Boulenger (part), 1894a, p. 353; 1897e, p. 801.

♂ (M.C.Z. 51148) Cholo Mtn. 21.iii.49..

Records. Nkata Bay to Ruarwe (B. as *scabra*); Zomba (G. & B. as *scabra*).

Variation. Midbody scale-rows 23; ventrals 250; anal entire; subcaudals 90; upper labials 7, the third and fourth entering the orbit; preocular 1; postoculars 2; temporals 3 + 4.

Size. Length 689 (570 + 119) mm.

Remarks. This race, recorded from Nyasaland for the first time, is readily recognizable by its more numerous subcaudals in both sexes and its pinkish brown coloring.

Habitat. Such coloring I have always found associated with the red laterite soils of which the foothills of Cholo Mountain are largely composed. Fortunately I met the man, carrying this snake, a mile below my camp, so it came from an altitude of about 3,000 feet.

Telescopus semiannulatus semiannulatus Smith

Telescopus semiannulatus A. Smith, 1849, Illus. Zool. S. Africa, Rept., pl. lxxii: South Africa (by inference).

Leptodeira semiannulata Boulenger, 1891a, p. 307.

Tarbophis semiannulatus Boulenger, 1896d, p. 51; 1897e, p. 801; Johnston, 1898, p. 361a.

♀ (M.C.Z. 51149) near Tete. 24.i.49.

Records. Karonga to Kondowe (B); Lake Nyasa (B); Nkata Bay to Ruarwe (B); "Nyika Plateau," (B: but a highly improbable record for this lowland snake).

Native name of the Tiger Snake. *Mberenga* (Nyungwe: but also applied to the Egg-eating Snake with which it is at times confused).

Variation. Midbody scale-rows 19; ventrals 235; anals 2; subcaudals 69; upper labials 8, the third, fourth and fifth (left), or third, fourth, fifth and sixth (right) entering the orbit; preocular 1; postoculars 2; temporals 2 + 2.

Color. About 24 blotches on the dorsum, and a further 6, scarcely distinguishable, on the tail.

Size. Length of ♀, 852 (730 + 122) mm.

Breeding. On January 24, this ♀ held 10 eggs each measuring about 28 x 10 mm.

Diet. The intestines held the apparently indigestible derm of a large gecko (*Pachydactylus b. turneri*).

Crotaphopeltis hotamboeia hotamboeia (Laurenti)

Coronella hotamboeia Laurenti, 1768, Syn. Rept., p. 85: India orientali, i.e. Africa.

Leptodira rufescens Günther, 1893 (1892), p. 555; Johnston, 1897, p. 362; 1898, p. 361a.

Leptodira hotamboeia Boulenger, 1896d, p. 89; 1879e, p. 801; Johnston, 1898, p. 361a.

Crotaphopeltis hotamboeia hotamboeia Bogert, 1940, p. 62.

Tarbophis barnumbrowni Bogert, 1940, Bull. Am. Mus. Nat. Hist., **77**, p. 66, fig. 9: Jigjiga, Ethiopa. Parker, 1949, p. 85.

♂ (M.C.Z. 51157) Vipya Plateau. 17.ix.48.
2 ♀♀ (M.C.Z. 51158–9) Chitala R. 16–18.xii.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 51160–3) Cholo Mtn. 18.iii.49.
♀ (M.C.Z. 51164) Ruo R., Mlanje Mtn. 8.iv.49.

Records. Blantyre (M); Chiromo (M); Fort Hill (B); Karonga (Bogert); Karonga to Kondowe (B); Misuku Mtns[1]. (B); Mlanje (Bogert); Nyika District and "Plateau" (B); Shire Highlands (G); Zomba (B).

Variation. Midbody scale-rows 19; ventrals 157–167; anal 1; subcaudals 29–46; upper labials 8, the third, fourth and fifth, or fourth and fifth, entering the orbit; lower labials 9–10, the first four or five in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 1 + 2.

Size. Largest ♂ (M.C.Z. 51157), 603 (530 + 73) mm.; largest ♀ (M.C.Z. 51158), 601 (540 + 61) mm.

Remarks. The opportunity is taken of referring to the synonymy of *hotamboeia*, *Tarbophis barnumbrowni*, a disposition with which its author concurs. It also serves the purpose of directing attention to the exceedingly close relationship between *Crotaphopeltis* and *Telescopus*, a name that was not preoccupied by *Telescopium* Montfort (1810) though Boulenger (1896d) mistakenly supposed it was and consequently employed the name *Tarbophis* which has been in general use ever since.

Breeding. On December 18, at Chitala River, a ♀ held 10 eggs measuring 15 x 8 mm.; though ova were small in another ♀ taken two days earlier at the same place.

Diet. One of these Savanna White-lipped Snakes from Chitala River was taken in the act of swallowing an adult toad (*Bufo carens*) while

[1] Midbody scale-rows 19 (*fide* H. W. Parker in letter: 1.v.51).

the stomach of the second was almost incredibly distended with another full-grown *carens*. The Ruo reptile held the undigested hind limbs of a frog (*Rana f. angolensis*), and one of the Cholo series a *Breviceps mossambicus*.

Crotaphopeltis hotamboeia tornieri (Werner)

Leptodira tornieri Werner, 1908 (1907), Sitzb. Akad. Wiss. Wien, **116**, Abt. **1**, p. 1875: Amani, Usambara Mtns., Tanganyika Territory.

2 ♂♂, 4 ♀♀ (M.C.Z. 51151–6) Misuku Mtns. 27.ix–8.x.48.

Records. New to Nyasaland, the most southerly record for this somewhat dwarfed, virgin-forest race found in the Usambara, Uluguru, Uzungwe, Ukinga and Rungwe Mtns.

Native name of the Sylvicoline White-lipped Snake. *Nawatonto* (Misuku).

Variation. Midbody scale-rows 17; ventrals 156–168; anal 1; subcaudals 36–48; upper labials 8–9, the fourth and fifth, or fourth, fifth and sixth (M.C.Z. 51155 only) entering the orbit; lower labials 8–10, the first four or five in contact with the anterior sublinguals; preoculars 2; postoculars 2–3; temporals 1 + 2.

Size. Both ♂♂ (M.C.Z. 51151–2), 302 (260 + 42) mm.; largest ♀ (M.C.Z. 51153), 380 (330 + 50) mm.

Diet. A sedge frog (*Hyperolius p. puncticulatus*) in one; *Arthroleptis s. whytii* in another; the hind half of a *Phrynobatrachus u. ukingensis* in a third.

Habitat. At 9.30 A.M. I took one as it was basking on the trunk of a fallen tree lying in a swamp fringing the forest; two others were near the base of wild bananas in a forest-edge ravine.

Hemirhagerrhis nototaenia nototaenia (Günther)

Coronella nototaenia Günther, 1864b, Proc. Zool. Soc. London, p. 309, pl. xxvi, fig. 1: Rios de Sena, Zambezi River, Mozambique.

Amphiophis nototaenia Boulenger, 1891a, p. 307.

Amplorhinus nototaenia Boulenger, 1896d, p. 125; 1897e, p. 801; Johnston, 1898, p. 361a.

♀ (M.C.Z. 8979) "Nyika Plateau." (Exch. Brit. Mus.) 1913.

Records. Cape Maclear, Lake Nyasa (B); Fort Hill (B); "Nyika Plateau" (B). We may be reasonably certain that this low country

snake never came from the Nyika Plateau. It is one of the few species I failed to secure during my visit because most of my time was spent above 5,000 feet.

Variation. Midbody scale-rows 17; ventrals 174; anals 2; subcaudals 76; upper labials 8, the fourth and fifth entering the orbit; lower labials 9, the first 4 in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 2 + 2.

Size. ♀, 409 (311 + 98) mm.

Rhamphiophis oxyrhynchus rostratus Peters

Rhamphiophis rostratus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 624: Tete; Mesuril and Quitangonha, Mozambique.

Rhamphiophis oxyrhynchus Boulenger (not Reinhardt), 1896d, p. 147.

9 (M.C.Z. 51165–73) Mtimbuka. 8–25.ii.49.
3 (M.C.Z. 51174–6) near Tete. 14–28.i.49.

Records. Fort Johnston (B); also Monkey Bay, to judge from a description furnished me by Rodney Wood, Esq.

Native name of the Eastern Beaked Snake. *Kasunjumere* (Yao).

Variation. Midbody scale-rows 17; ventrals 159–178; anals 2; subcaudals 87–101; upper labials 7–9, the fifth, rarely the fourth, entering the orbit (prevented by transverse division of fifth labial on the right side of M.C.Z. 51174); lower labials 10–12, the first 4 or 5 in contact with the anterior sublinguals; preoculars 3; postoculars 2; temporals 2 + 2, 2 + 3, 2 + 4 or 3 + 3.

Size. Largest snake, a topotype (M.C.Z. 51174), 1472 (1065 + 407) mm. Either all are ♀♀, or the hemipenes are so inconspicuous in this species as to make sexing difficult. Only two specimens are of large size, the rest are under 548 mm.

Diet. At Mtimbuka one held a young *Nucras i. ornata*, another the tail of a skink (*Mabuya* sp.) whose owner had escaped.

Habitat. I captured one beneath the thatch of a collapsed hut in the middle of a village.

Psammophylax tritaeniatus tritaeniatus (Günther)

Rhagerrhis tritaeniatus Günther, 1868a, Ann. Mag. Nat. Hist. (4), **1**, p. 423, pl. xix, fig. 8: Southeast Africa.

Trimerorhinus tritaeniatus Boulenger, 1896d, p. 139; 1897e (part), p. 801; Johnston, 1898, p. 361a.

Cerastes tritaeniatus tritaeniatus Bogert (part), 1940, p. 70 (Karonga only).

♂ ♀ (A.M.N.H. 67770–1) Kasungu. 19–23.viii.46.
♂ (A.M.N.H. 67751) Nchisi Mtn. 23.vii–13.ix.46.
2 ♀ ♀ (M.C.Z. 51177–8) Nchisi Mtn. 27.xi.48.

Records. Chiradzulu[1] (B); Chiromo (Mitchell ms.); Chitala River (Mitchell ms.); Fort Hill (B); Karonga (Bogert); Karonga to Kondowe (B); Zomba[1] (B).

Native name of the White-bellied Grass-Snake. *Msalulu* (Chewa and Ngoni).

Variation. Midbody scale-rows 17; ventrals 156–160; anals 2; subcaudals 54–60; upper labials 8, the fourth and fifth entering the orbit; lower labials 9–11, the first 4 or 5 in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 2 + 3, rarely 2 + 2 or 2 + 4.

Color in life. ♀ (M.C.Z. 51177). Above, crown of head, back and tail deep brown, the lower half of the outermost dorsal scale-row pale brown; immediately below this on the flank is a broad, black, lateral band 2½ scales in width, still lower the last 2 (anteriorly) to 2½ (rest of body) scale-rows are pale lemon yellow, the lowest row faintly streaked with orange as far back as the anus. Below, china white, uniform.

Size. Larger ♂ (A.M.N.H. 67770), 600 (487 + 113) mm.; largest ♀ (M.C.Z. 51177), 746 (600 + 146) mm.

Remarks. Strictly speaking *Cerastes* Laurenti is the correct name to apply to members of this genus through the regrettable action of Ferjérváry (1923) designating *Coluber rhombeatus* Linné as genotype, (*vide* Mertens, 1937, Copeia, p. 70). In both medical and popular works, however, *Cerastes* has been too long associated with certain vipers to make such a change rational. It is a case where the powers of the International Commission on Zoological Nomenclature should be invoked to set it aside.

Boulenger (1896d) attributed *Psammophylax* to Günther (1858) whereas it dates from Fitzinger (1843), so takes precedence over *Trimerorhinus* of A. Smith (1847). Boulenger's attempt to distinguish *tritaeniatus* from *variabilis* on characters that are now known to be common to both reptiles, resulted in his confusing the two forms. Owing to their being inseparable by scale counts, I relegated *variabilis* to the synonymy of *tritaeniatus* in 1932. Since when I have consistently misapplied the name *tritaeniatus* to the gray-bellied, montane

[1] Bellies white in all 1 + 7 snakes (*fide* J. C. Battersby in letter: 17.v.51).

race described by Günther from the Shire Highlands.

Consequently, when the two, handsomely colored, white-bellied snakes were brought up the mountain to me at Nchisi, I immediately recognized that they represented a species of snake with which I was quite unfamiliar. Indeed, at first I though they might represent an undescribed form of *Psammophis*. Shortly afterwards I received a letter from C. J. P. Ionides, Esq., of Liwale, Tanganyika Territory, saying that specimens of a snake he had taken at relatively low altitudes there, had been identified as *t. tritaeniatus*. At my request he very kindly sent me a dozen specimens and they are all white-bellied in sharp contrast to *t. variabilis*.

Psammophylax tritaeniatus variabilis Günther

Psammophylax variabilis Günther, 1893 (1892), Proc. Zool. Soc. London, p. 557, pl. xxxv: Shire Highlands, Nyasaland. Günther, 1894a (1893), p. 619; Bocage, 1896a, p. 103; Johnston, 1897, p. 362; 1898, p. 361a.

Trimerorhinus variabilis Boulenger, 1896d, p. 140; 1915c, p. 629.

Trimerorhinus tritaeniatus Boulenger (part: not of Günther, 1868), 1897e, p. 801 (Nyika Plateau only).

1 ♂, 1 ♀ (A.M.N.H. 67742–3) Zomba Plateau. 27.v–11.vi.46.
1 ♂, 1 ♀ (A.M.N.H. 67781–2) Mlanje Plateau. 24.vi–18.vii.46.
3 ♀♀ (M.C.Z. 51179–81) Nyika Plateau. 4–17.xi.48.
1 ♂, 2 ♀♀ (M.C.Z. 51182–4) Zomba Plateau. 6–9.ix.48.
2 ♂♂, 4 ♀♀ (M.C.Z. 51185–90) Mlanje Plateau. 9–10.viii.48.

Records. Nyika Plateau, 6000–7000 feet (B); Shire Highlands (= Mlanje and Zomba. G); Zomba (B).

Variation. Midbody scale-rows 17; ventrals 152–161; anals 2; subcaudals 50–60; upper labials 8, the fourth and fifth entering the orbit; lower labials 9–11, the first 5 in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 1 + 2 or 1 + 3, in two snakes a small corner of the large anterior temporal is split off on one side only.

Color. This species is well-named *variabilis*. Of four I dug from their hibernating hole, one ♀ was vividly striped, two ♀♀ were olive, while the only ♂ was blackish above and below (cf. Günther's colored plate).

Size. Largest ♂ (M.C.Z. 51185), 835 (686 + 149) mm.; largest ♀ (A.M.N.H. 67743), 658 (545 + 113) mm.; smallest specimen (M.C.Z. 51184), 285 (230 + 55) mm.

Remarks. The name *P. t. variabilis* should be applied to all the montane snakes which I have been miscalling *P. t. tritaeniatus* since 1932. Temporal formulae and ventral coloring serve to separate the two races.

Breeding.

On August 10, on Lichenya Plateau, a ♀ held 8 eggs *ca.* 20 x 10 mm.
" 10 " " " " " " 9 " " 23 x 10 mm.
On November 17, on Nyika Plateau an adult ♀ held no developing ova.

Diet. A mouse (*Lophuromys a. aquilus*) was present in one Zomba snake, gray rodent fur in a Mlanje reptile; a skink (*Mabuya b. mlanjensis*) in another, while the stomach of a Nyika snake held the undigested tail of a *M. r. nyikae* together with a small toad (*Bufo t. nyikae*); the juvenile Zomba reptile had swallowed a sedge frog (*Hyperolius* sp.).

Parasites. Cestodes were numerous in the viscera of one Nyika snake.

Hibernation. In Nyasaland, July is the coldest month of the year and few reptiles were abroad on the Lichenya Plateau in August. All six snakes obtained on Mlanje were dug from one or other of two rodent burrows outside which the snakes were sunning. One hole was situated between two boulders, the other at the base of a *Protea* bush; both were shallow.

Habitat. Somewhat to my surprise I found one of these snakes basking along a horizontal fence post on Zomba Plateau.

Dromophis lineatus (Duméril & Bibron)

Dryophylax lineatus Duméril & Bibron, 1854, Erpét. Gén., **7**, p. 1124: White Nile, Anglo-Egyptian Sudan.

Dromophis lineatus Boulenger, 1897, p. 801; Johnston, 1898, p. 361a. Loveridge 1940c, p. 7 (generic revision).

Records. Karonga to Kondowe (B); "Nyika Plateau," (B. in error). That Whyte obtained this lowland form on the Nyika is utterly improbable. I have taken it at Mwaya, just north of Karonga, on the lakeshore littoral on a previous safari but failed to find it in Nyasaland, which is the southeasterly limit of its range. This species is likely to be mistaken for *Psammophis s. sibilans* which it resembles in external appearance, but differs from it in dentition.

Psammophis sibilans sibilans (Linné)

Coluber sibilans Linné (part), 1758, Syst. Nat., ed. 10, **1**, p. 222: "Asia." The type locality is hereby restricted to Egypt, by subsequent designation (A.I.).

Psammophis brevirostris Peters (part), 1881b, Sitzb. Ges. Naturf. Freunde Berlin, p. 89: Xa Matlale, Mozambique.

Psammophis sibilans var. *mossambica* Peters, 1882a, Reise nach Mossambique, **3**, p. 122: Mozambique Island, Mozambique.

Psammophis sibilans var. *tettensis* Peters, 1882a, Reise nach Mossambique **3**, p. 122: Tete (restricted) and Mozambique Island, Mozambique.

Psammophis sibilans Günther, 1894a (1893), p. 618; Boulenger, 1896d, p. 161; 1897e, p. 801; Johnston (inc. var. *intermedia* Fischer), 1897, p. 362; 1898, p. 361a.

Psammophis sibilans sibilans Loveridge, 1940c, pp. 30–41 (revision); Bogert, 1940, p. 79, figs. 14 & 15H.

♀ (A.M.N.H. 67774) Kasungu. 19–23.viii.46.
2 ♂♂ (A.M.N.H. 67749–50) Nchisi Mtn. 27.iii–13.ix.46.
♂ (A.M.N.H. 67759) Likabula River. 19.vi–18.vii.46.
2 ♀♀ (M.C.Z. 51191–2) Nchenachena. 20.xi.48.
2 ♀♀ (M.C.Z. 51193–4) Nchisi Mtn. 30.xi.48.
♂ ♀ (M.C.Z. 51195–6) Likabula River. 29.vii.48.
4 juv. (M.C.Z. 51197–200) Mtimbuka. 8–28.ii.49.
skull & 7 (M.C.Z. 51201–7) near Tete. 13–24.i.49.

Records. Chiromo (Mitchell ms.); Cholo (Mitchell ms.); Fort Hill (B); Fort Johnston (G); Karonga to Kondowe (B); Misuku Mtns. (B); Mlanje (Bogert); Nkata Bay to Ruarwe (B); Shire Highlands (G); Zomba (B).

Native names of Hissing Sand-Snake. *Liwui* (Yao); *mui* (Chewa; Ngoni).

Variation. Midbody scale-rows 17; ventrals 160–178; anals 2, rarely 1 (in A.M.N.H. 67750 only); subcaudals 90–105; upper labials 7–8, the fourth and fifth, rarely the third and fourth, entering the orbit; lower labials 9–11, the first 4 or 5 in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 2 + 2 or 2 + 3 (1 + 1 due to fusion with parietal on right side of M.C.Z. 51201).

Size. The tails of all the largest snakes (H. & B. ♂, 990 mm.; ♀, 952 mm.) are truncate; largest perfect ♂ (M.C.Z. 51201), 1314 (910 + 404) mm.; and ♀ (M.C.Z. 51194), 1150 (835 + 315) mm.

Diet. A shrew (*Crocidura* sp.) in a young Nchenachena snake; fur in intestines and bird quills in stomach of an Nchisi reptile; a skink

(*Mabuya v. varia*) at Mtimbuka; frogs (*Rana o. oxyrhynchus* and *Phrynobatrachus perpalmatus*) in two Tete snakes, while a very young one held the limb bone of a frog, besides beetle elytra and a grasshopper.

Parasites. Both Likabula snakes were infested with parasites. These consisted of pentastomids (*Porocephalus* sp., probably *subulifer*) and nematodes (*Abbreviata* sp., probably *varani;* and *Polydelphis* sp., probably *sewelli*).

Habitat. We caught four juvenile examples of this lacustrine species under damp debris left on sandbars by the shrinking Zambezi at the height of the dry season — January 2 and 4, 1949.

Psammophis subtaeniatus sudanensis Werner

Psammophis subtaeniatus var. *sudanensis* Werner, 1919, Denks. Akad. Wiss. Wien, **96**, p. 504: Kadugli, Anglo-Egyptian Sudan (designated).
Psammophis sibilans var. *subtaeniata* Boulenger (not of Peters), 1891a, p. 307.
Psammophis subtaeniatus Boulenger (not of Peters), 1896d, p. 160; 1897e, p. 801; Johnston, 1898, p. 361a.
Psammophis subtaeniatus sudanensis Loveridge, 1940c, pp. 50–55 (revision).

1 (A.M.N.H. 67780) Kasungu. 19–23.viii.46.
2 (A.M.N.H. 67794–5) Kotakota. 9–10.viii.46.
1 (A.M.N.H. 67784) Chibotela. 24.viii–8.ix.46.
1 (A.M.N.H. 67760) Likabula R. 19.vi–18.vii.46.
5 (M.C.Z. 51220–3) Chitala R. 14–18.xii.48.
1 (M.C.Z. 51219) Mtimbuka. 11.ii.49.

Records. Cape Maclear (B); Fort Hill (B); Lake Nyasa (B); Misuku Mtns. (B); Nkata Bay to Ruarwe (B); "Nyika Plateau" (B); Zomba (B).

Native names of the Northern Stripe-bellied Sand-Snake. *Msalula* (Yao).

Variation. Midbody scale-rows 17; ventrals 154–167; anals 2; subcaudals 102–115; upper labials 8, the fourth or fifth entering the orbit; lower labials 9–11, the first 4 in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 2 + 2 or 2 + 3, rarely 1 + 2 (on three sides of two Chitala snakes).

Size. Largest ♂ (M.C.Z. 51220), 1220 (820 + 400) mm.; largest ♀ not exceptional.

Remarks. Small wonder that Boulenger (1891a) once thought this snake but a race of *sibilans* for the two reptiles cannot be distinguished

by lepidosis. I was particularly anxious to secure Nyasaland examples of *subtaeniatus* so as to ascertain whether I had been correct in assigning all Nyasaland material to the northern race at the time (1940c) the genus was revised. That action is fully justified by this additional material. Apparently the Zambezi does serve as a barrier between the two races.

Diet. A multimammate mouse (*Mastomys c. microdon*) in the large Chitala male; a frog (*Arthroleptis s. sudanensis*) in one of the smaller snakes.

Enemies. In the stomach of a Cape File Snake (*Mehelya c. capensis*) was the tail of a *subtaeniatus* whose owner had obviously wriggled free. Of the snakes listed above, half-a-dozen have lost the ends of their tails, one, indeed, possesses only a well-healed, post-anal stump.

Habitat. Unlike *sibilans*, this is a snake of the dry savanna, yet I shot a young one as it rested on partly submerged branches in a 20-foot well, up whose brick sides it could scarcely have scaled.

Psammophis subtaeniatus subtaeniatus Peters

Psammophis sibilans var. *subtaeniata* Peters, 1882a, Reise nach Mossambique, **3**, p. 121: Boror and Tete, Mozambique.

2 skulls + 13 (M.C.Z. 51208–18) near Tete. 6–22.i.49.

Records. These are topotypes of the typical form characterized by three labials entering the orbit, besides more numerous ventrals and subcaudals. This race is unknown from Nyasaland but should be looked for in the lower Shire Valley.

Native name of the Southern Stripe-bellied Sand-Snake. *Nyamzalumbu* (Nyungwe), but Peters states it is called *njamudsarumbe* at Tete.

Variation. Midbody scale-rows 17; ventrals 164–175; anals 2; subcaudals 117–126; upper labials 9, the fourth, fifth and sixth entering the orbit, *except* for one snake which agrees with the northern form in having only 8, with the fourth and fifth entering, and one side of M.C.Z. 51215 where there are 10, the fifth, sixth and seventh entering; lower labials 9–11, the first 4 or 5 in contact with the anterior sublinguals; preocular 1; postoculars 2, rarely 3 (M.C.Z. 51212 only); temporals 2 + 2 or 2 + 3.

Size. Largest ♂ (M.C.Z. 51210), 1187 (762 + 425) mm.; ♀ (M.C.Z. 51218), 1340+ (885 + 455+) mm., tail-tip missing.

Diet. One held a young *Rattus r. alexandrinus*, another a young monitor (*Varanus n. niloticus*); in a third was a skink (*Mabuya s. ellenbergeri*), while a fourth held the entire tail of a *Mabuya lacertiformis*, the lizard having escaped.

Habitat. This last snake I shot after sunset (i.e. about 6.15 P.M.) as it was prowling among the rocks where these lizards had been basking. Another snake was killed on the tree trunk outside my tent. Yet another, surprised on a gravel-strewn hillside when the temperature was about 90°, sought refuge in a hole from which we dug it.

Psammophis angolensis (Bocage)

Amphiophis angolensis Bocage, 1872, Jorn. Sci. Lisboa, **4**, p. 82: Donda, i.e. Dondo, Loanda, Angola. Bocage, 1896a, p. 103.

Psammophis angolensis Boulenger, 1891a, p. 307; 1896d, p. 170; 1897c, p. 801; Johnston, 1898, p. 361a; Sternfeld, 1910a, p. 31; Loveridge, 1940c, pp. 68–69 (revision).

♀ (A.M.N.H. 67772) Kasungu. 19–23.viii.46.

Records. Cape Maclear (B); Fort Hill (B); Fort Johnston (B); Lake Nyasa (S).

Variation. Midbody scale-rows 11; ventrals 149; anals 2; subcaudals 67; upper labials 8, the fourth and fifth entering the orbit; lower labials 7, the first 4 in contact with the anterior sublinguals; preocular 1; postoculars 2; temporals 1 + 2.

Size. Length of ♀, 400 (293 + 107) mm.

Thelotornis kirtlandii oatesii Günther

Dryiophis Oatesii Günther, 1881b, in Oates, Matabeleland and the Victoria Falls, App., p. 330, col. pl. D: Matabeleland, Southern Rhodesia (*fide* Boulenger). 1894a (1893), p. 618; Johnston, 1897, p. 362; 1898, p. 361a.

3 ♂♂ (A.M.N.H. 67776–8) Kasungu. 19–23.viii.46.
1 ♂, 5 ♀♀ (M.C.Z. 51230–5) Mtimbuka. 7.ii–4.iii.49.

Record. Fort Johnston (G).

Native name of Central African Vine-Snake. *Nalikukuti* (Yao).

Variation. Midbody scale-rows 19; ventrals 164–176; anals 2; subcaudals 140–146; upper labials 7–8, the fourth and fifth, rarely fourth only (right side of M.C.Z. 51234) entering the orbit; lower labials 9–12, the first 3–5 (3 on left side of A.M.N.H. 67778) in contact with the

anterior sublinguals; preocular 1; postoculars 2–3; temporals 1 + 2.

Color in life. Of a ♂ juv. (M.C.Z. 51230) as it differs strikingly from that of the adults. Above, crown whitish, *very* faintly tinged with soft green; on posterior part of frontal and between parietals are dusky marks with darker centers; loreal region also flecked with darker and the pale brown temporals edged with black; rostral, upper and lower labials pure white except for an oblique series of greenish dots across the sixth upper labial to the lower postocular and eye; eye cream-colored except for the lower part beside and below the pupil, which is greenish; back and tail vinous.

Size. Largest ♂ (A.M.N.H. 67778), 1343+ (880 + 463+) mm.; largest ♀ (M.C.Z. 51234), 1400+ (910 + 490+) mm.; juv. ♂ (M.C.Z. 51230), 457 (295 + 162) mm.

Remarks. In my (1944q, p. 154) revision of *Thelotornis,* I followed Boulenger (1896d, p. 185) in considering *oatesii* synonymous with *capensis.* Perhaps it may yet prove too ill-defined to be recognizable. In Nyasaland, however, I found the big vine-snake inhabiting the lowland savanna could be distinguished at a glance from its montane forest representative. Where deforestation has taken place recently, these habitat differences may not hold good, for on a former expedition I found the forest type plentiful at Mwaya, in low-level country on Nyasa's northwest shore.

While the speckled-headed form is unquestionably *T. k. capensis* of Smith, the lowland form (*oatesii*) is in several respects intermediate between *capensis* and the spotless-headed *kirtlandii* of West Africa. In the type of *oatesii* the speckling on the head is reduced to a few large spots arranged in a Y-shaped marking whose stem lies along the interparietal suture and its arms extend across the posterior portion of the frontal to the supraoculars. Except that the spots are even more coalesced than in Günther's figure, this is the pattern common to all the adults listed above and is indicated in the juvenile whose coloring has been described. The Nyasaland material all shows the striking black chain-like marking across the temporal region figured by Günther. I have no other material of *oatesii* but am inclined to think that in this latitude it extends right across the continent to Angola. This is suggested by the high ventral counts of Angolan snakes, and Bocage's (1895a, p. 119) recognition of two forms when he separated off the eastern, speckled-headed snakes as *mossambicana,* a synonym of *capensis* Smith.

Contrasting data of this Nyasaland material

Subspecies	*Ventrals*	*Subcaudals*	*Largest* ♂	*Largest* ♀	*Head marks*
k. capensis	149–164	126–145	1250 mm.	1215 mm.	a Y
k. oatesii	164–176	140–146	1343+mm.	1400+mm.	speckled

Diet. A skink (*Mabuya v. varia*) in one, a frog (*Phrynobatrachus perpalmatus*) in another.

Habits. Relying on her protective coloring, one large vine-snake allowed me to take hold of her neck with my forceps as she rested entwined in a tall bush, growing at the base of a baobab almost on the lake shore.

Thelotornis kirtlandii capensis Smith

Thelotornis capensis A. Smith, 1849, Ill. Zool. S. Africa, **3**, App., p. 19: "Kaffirland and the country towards Port Natal," i.e. Durban.

Thelotornis kirtlandii Boulenger, 1891a, p. 307: 1896d, p. 185; 1897e, p. 801; Johnston, 1898, p. 361a; Sternfeld, 1910a, p. 31.

Thelotornis kirtlandii capensis Loveridge (part), 1944q, pp. 154–159 (revision).

2 ♀ ♀ (A.M.N.H. 67757–8) Likabula R. 19.vi–18.vii.46.
5 ♂ ♂, 5 ♀ ♀ (M.C.Z. 51224–9) Misuku Mtns. 2–16.x.48.
♂ (M.C.Z. 51250) Chowe, Mangoche. 12.ii.49.
10 ♂ ♂, 13 ♀ ♀ (M.C.Z. 51240–9) Cholo Mtn. 11–25.iii.49.
2 ♂ ♂, 2 ♀ ♀ (M.C.Z. 51236–9) Likabula R. 30.vii–3.viii.48.

Records. The preceding synonymy and following records (except the material from Mlanje and Zomba which I have seen) must be regarded as purely tentative pending an examination of all the material in the British Museum. The scale counts of these Zomba snakes as recorded by Boulenger (1896d, p. 186) were often erroneous, especially as regards subcaudals; the amended counts are included in the key on p. 320.

Lake Nyasa (B:S); Mandala (B); Mlanje (B); "Nyika Plateau" (B); Shire Highlands (G); Zomba (B).

Native names of Cape Vine-Snake. *Lukomo* (Misuku); *nalikukuti* (Manganja and Nyanja).

Variation. Midbody scale-rows 19 (but only a few counted); ventrals 148–164; anals 2; subcaudals 126–145; upper labials 8–9; the fourth and fifth, rarely the third, fourth and fifth (two sides), or fifth and sixth (two sides) entering the orbit; lower labials 9–12, the first 4 or 5 in contact with the anterior sublinguals; preocular 1; post-

oculars 2–4, usually 3; temporals 1 + 2, rarely 1 + 1 (one side), 1 + 3 (one side), or 2 + 2 (one side).

Size. Largest ♂ (M.C.Z. 51248), 1250 (765 + 485) mm.; largest ♀ (M.C.Z. 51238), 1215 (785 + 430) mm.

Color. Typically, as in Matipa snakes, the entire top of the head is flecked with black, but among Cholo snakes there is a marked tendency towards restrictions of these markings to the crown, some even foreshadowing the Y-shaped pattern of *oatesii*, but not the characteristic black temporal chain of that form. Tongues scarlet with black tips.

Breeding. No sign of breeding among the many ♀ ♀ taken in March, but on October 8, in Matipa Forest, a ♀ held 8 eggs about 32 x 17 mm., and on the same date and place another with 8 eggs about 35 x 14 mm. These latter appeared quite ready for laying.

Diet. Five had eaten chameleons (2 gravid ♀ ♀ *Brookesia nchisiensis;* 3 *Chamaeleo d. dilepis*); the Chowe snake held the spinous tail of a zonure (*Cordylus c. tropidosternum*); at Cholo one had eaten a gecko (*Lygodactylus a. angularis*), another a skink (*Mabuya v. varia*), two held green snakes (*Philothamnus i. irregularis*), four had swallowed sharp-nosed frogs (*Rana o. gribinguiensis*) and three pugnosed frogs (*Breviceps mossambicus*). In the same stomach with one *Breviceps* was a mass of very large and fat, winged termites, whose fresh condition made it appear unlikely they had been spued up by the frog or liberated by the gastric juices — for only the hind limbs of the amphibian remained undigested. Only one vine-snake held the remains of a bird, and as my previous records also indicate that cold-blooded creatures constitute the principal prey of this species, I think it would be advisable to abandon the alternative name of "Bird Snake."

Temperament. A two-and-a-half foot vine-snake came in under the awning extension of my tent as I was seated at the table in front of the tent proper. The reptile "froze" as I rose to meet it, and, relying on its cryptic coloring, permitted me to pass within two feet of its head as it lay fully extended. Turning, I picked it up by the tail (13.iii.49).

As I was returning to my tent I came on a vine-snake resting motionless in a bush, its head and tail concealed among the foliage. I seized what I supposed was the posterior third, but vine-snakes taper in both directions and I had actually grasped the reptile four inches behind the head. Gaping widely, the snake struck at my thumb, causing the knuckle to bleed but without any symptoms of poisoning (17.iii.49).

Dispholidus typus (Smith)

Bucephalus typus A. Smith, 1829, Zool. Journ., **4**, p. 441: Old Latakoo, South Africa.

Dispholidus typus Boulenger, 1896d, p. 187; 1897e, p. 801; Johnston, 1898, p. 361a; Bogert, 1940, p. 68; Mitchell, 1946, p. 42.

♀ (A.M.N.H. 67775) Kasungu. 19–23.viii.46.
♂ (A.M.N.H. 67785) Chibotela. 28.viii–18.ix.46
♂ (M.C.Z. 51551) Misuku Mtns. 2.x.48.
♂ (M.C.Z. 51552) Nchenachena. 26.x.48.
♀ (M.C.Z. 51553) Mzimba. 23.xi.48.
4 ♂♂, 1 ♀ (M.C.Z. 51554–8) Nchisi Mtn. 8–10.xii.48.
♀ (M.C.Z. 51559) Chitala River. 17.xii.48.
♀ (M.C.Z. 51560) Mtimbuka. 11.ii.49.
♀ (M.C.Z. 51561) Cholo Mtn. 11.iii.49.
♀ (M.C.Z. 51562) Boroma Mission, M. 25.i.49.

Records. Mzimba (Bogert); "Nyika Plateau" (B); Zomba (B). Seen at Blantyre, Chiromo and Port Herald by Mitchell.

Native names of the Boomslang. *Kweza* (for green ♂: Chewa); *muu* (for brown ♀: Chewa); *miyalalwe* (Misuku); *sanga* (Nyanja). Often confused with the Black Mamba, *vide infra.*

Variation. Midbody scale-rows 19; ventrals 174–194; anals 2; subcaudals 104–123; upper labials 7, the third and fourth, rarely third only (M.C.Z. 51558 only) entering the orbit; lower labials 8–12, the first 4 in contact with the anterior sublinguals; preocular 1; postoculars 3; temporals 1 + 2, rarely 1 + 1 (M.C.Z. 51559 only), while there is the appearance of 2 + 2 (on both sides of M.C.Z. 51561) owing to a piece of the parietal being split off.

Size. Largest ♂ (M.C.Z. 51557), 1570 (1175 + 395) mm.; largest ♀ (M.C.Z. 51560), 1542 (1122 + 420) mm.

Color. This is strikingly different in the two sexes in Nyasaland, but does not necessarily hold elsewhere in Africa. The ♂♂ — with the exception of the halfgrown (845 mm.) Chibotela snake — were vivid green. The ♀♀ ranged from pinkish brown to drab brown. Of the latter hue was the Mtimbuka ♀, brought to me within half-an-hour of a big mamba of the same shade and size. Small wonder that the natives confuse the two species and for boomslangs furnished me with the name of the mamba both at Mtimbuka (*mbobo:* Yao) and at Boroma near Tete (*nyakungu:* Nyungwe).

In life. Mzimba ♀. Above, pinkish brown; lips, and chin white;

sides of throat streaked with yellow; flanks whitish finely flecked with reddish brown and each alternate scale of the lowest series exhibiting a gray-black dash. Below, white, heavily flecked with reddish brown so as to produce an exceptionally beautiful pinkish appearance.

In life. Nchisi ♀. Above, uniform "mamba" brown; lips, chin, throat, and anterior fifth of body slightly greenish white; rest of undersurface plumbeous. The Chitala, Mtimbuka, Cholo and Boroma snakes were all of this type as noted down at the time.

Sexual dimorphism. If present, it will only be average, for 7 ♂♂ show a ventral range of 174–194, their subcaudals 111–123; 7 ♀♀ show a ventral range of 183–194, their subcaudals 104–123.

Breeding. About August 19–23, at Kasungu, a ♀ held 14 eggs measuring *ca.* 40 x 16 mm. No other ♀♀ were gravid.

Diet. Two chameleons (*Chamaeleo d. dilepis* and *C. d. petersi*) were dying of boomslang venom when their attackers were captured. A further five chameleons, all very large *dilepis*, were recovered from the stomachs of as many snakes.

Enemies. The Nchisi series were taken from acacia trees just below the Boma, from whose veranda we watched two Chewa youths hunting them. They shot the snakes very neatly with arrows, and three males were obtained in this way by one lad on December 10.

Calamelaps unicolor polylepis Bocage

Calamelaps polylepis Bocage, 1873b, Jorn. Sci. Lisboa, **4**, p. 216: Dondo, Angola. Boulenger, 1896d, p. 246; Sternfeld, 1910a, p. 32, fig. 36.
Calamelaps miolepis Günther, 1888b, Ann. Mag. Nat. Hist. (6), **1**, p. 323: Cape Maclear, Lake Nyasa, Nyasaland.
Calamelaps unicolor polylepis Loveridge, 1944q, p. 162 (revision).

Records. Cape Maclear, at the southern end of Lake Nyasa, is the site of the *original* Livingstonia Mission.

Remarks. The Angolan Purple-glossed Snake is distinguished from the following form only by its possession of 21 midbody scale-rows. Nyasaland is in the general region where three forms meet and I was disappointed in failing to obtain a series of this burrowing snake that so closely resembles the burrowing adders.

Calamelaps unicolor warreni Boulenger

Calamelaps warreni Boulenger, 1908b, Ann. Natal Mus., **1**, pp. 230, 234, fig. 3: Kosi Bay, Zululand.

♂ (M.C.Z. 51563) near Tete. 14.i.49.

Variation. Midbody scale-rows 19; ventrals 184; anals 2; subcaudals 29; upper labials 6, the third and fourth entering the orbit; lower labials 6, the first 3 in contact with the anterior sublinguals; preocular 0; postocular 1; temporal 1.

Size. ♂, 425 (383 + 42) mm.

Remarks. This Eastern Purple-glossed Snake was killed in Kasumbadedza village after a heavy shower. Whether the race can be maintained as distinct from *C. u. polylepis* remains to be seen. In all probability both forms will be found to occur in Nyasaland.

Aparallactus lunulatus lunulatus (Peters)

Uriechis lunulatus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 323: Tete, Mozambique.

Aparallactus lunulatus Boulenger, 1896d, p. 258; Loveridge, 1944q, p. 195 (revision).

♀ (M.C.Z. 51564) near Tete. 14.i.49.

Records of the Blotched-back Centipede-eater. Lake Nyasa (B).

Variation. Midbody scale-rows 15; ventrals 161; anal 1; subcaudals 50; upper labials 6, the third and fourth entering the orbit; lower labials 7, the first 4 in contact with the anterior sublinguals; preocular 1, in contact with the nasal; postocular 1; temporals 1 + 1.

Size. ♀, 525 (430 + 95) mm., by far the largest example known.

Color. This exceptionally large topotype lacks the greenish tinge of Peters' (1882a, pl. xviii, fig. 2) figure, while the lunar markings on nape, though present, are exceedingly faint. In general, this ♀ is pinkish brown, the margin of each scale edged with black resulting in a reticulated appearance and offering a resemblance to a young *Rhamphiophis o. rostratus.*

Habitat. Hoed up in a native plot close to Kasumbadedza village on the morning after a heavy shower.

Aparallactus ? capensis capensis Smith

Aparallactus capensis A. Smith, 1849, Illus. Zool. S. Africa, Rept., app. p. 16: Kaffirland to the eastward of Cape Colony. Bogert, 1940, p. 43 (Mlanje).

Uriechis capensis Günther, 1893 (1892), p. 555 (Zomba); Johnston, 1897, p. 362.

? *Aparallactus punctatolineatus* Boulenger, 1895h, Ann. Mag. Nat. Hist. (6), **16**, p. 173: Biballa, Angola. Boulenger, 1896d, p. 261 (Chiradzulu).

Aparallactus nigriceps Boulenger (part: not of Peters), 1895h, p. 173; 1896d, p. 260 (Zomba).

Aparallactus capensis capensis Loveridge (part), 1944q, pp. 205–210 (revision: but *omit* Lake Nyasa and Shire Highlands).

♂ (M.C.Z. 51565) Blantyre (B. L. Mitchell). xi.46.

Records. Vide cit. supra; add Chitala River from below?

Variation. In my revision of *capensis* I synonymized *punctatolineatus* (which has the second and third labials entering the orbit) assuming that, as it occurs within the range of *capensis* (which differs only in having the third and fourth labials entering) the few known specimens were variants towards *nigriceps* of Tete (a species that is still, after a century, known only from Peters' types and Bianconi's specimen, yet well distinguished by the low ventral (108–123) and subcaudal (20–35) counts).

Whether I was correct remains to be seen in view of the following data:

	Locality	*Labials*	*Ventrals*	*Subcaudals*
Bogert's *capensis*	Mlanje	3rd & 4th	141	47
Boulenger's *punctatolineatus*	Zomba	2nd & 3rd	149	40
Boulenger's "*nigriceps*"	Chiradzulu	"	160	36
M.C.Z. 51565 listed above	Blantyre	"	150	40

If only some Nyasaland resident would take the trouble to collect a score or more of these little snakes, the question might be settled.

Color. Black of the head merged with the six-scale-wide black collar, but two light spots indicate where the light anterior border of the collar would normally be; body and tail rosy pink. Below, uniform white.

Enemies. A partly digested snake with coloring similar to that of the Cape Centipede-eater, was in the stomach of an eagle owl (*Bubo lacteus*) that I shot in a tree overhanging the Chitala River.

Aparallactus guentheri Boulenger

Uriechis capensis Günther (not of Smith), 1888b, p. 324; Boulenger, 1891a, p. 308; Johnston, 1897, p. 362; 1898, p. 361a.

Aparallactus Guentheri Boulenger (part: exclude Angola), 1895h, Ann. Mag. Nat. Hist. (6), **16**, p. 172: Lake Nyasa and Shire Highlands, Nyasaland;

Zanzibar. Boulenger, 1896d, p. 259, pl. xi, fig. 2; Sternfeld, 1910a, p. 36.

Remarks. When preparing my revision of the genus *Aparallactus,* published during the war, I (1944q, pp. 181–213) was unable to obtain information regarding the three cotypes of *guentheri,* which Boulenger separated from *capensis* on the basis of their divided nasals. As division occurs spasmodically among undoubted *capensis,* I relegated *guentheri* (with the exception of the Angolan specimen mentioned by Boulenger, which I assigned to *c. bocagii*) to the synonymy of *c. capensis.*

In this I was mistaken, for though in scale counts *guentheri* agrees absolutely with *c. capensis,* and both species occur in the same locality, there are the distinctions mentioned in the key accompanying this paper (p. 321). Apparently the characteristic jet black or plumbeous coloring of *guentheri* had faded, for Boulenger described it as being "Blackish brown above, a little lighter beneath . . ."

Failing to find this species in Nyasaland, I made the following notes about the cotypes, and some others, on my return journey when passing through London.

		Ventrals	*Caudals*
B.M. 94.10.13.11 renumbered 1946.1.6.81	ex. Zanzibar.	—	—
B.M. 77.7.2.9. " 1946.1.6.88	ex. L. Nyasa.	149	59
B.M. 91.12.31.35 " 1946.1.8.59	ex. Shire Highlands.	162	51
B.M. 96.6.23.3 (not *nigriceps* of Cat.)	ex. Zomba.	151	53
B.M. 1902.2.12.102	Mazoe, Southern Rhodesia.	157	58
B.M. 1902.6.7.9.	Mombasa, Kenya Colony.	156	47

The entire back and tail of this (faded brown) Mombasa snake is vermiculated with white which almost forms a parallel series of white-edged, dark blotches in the middle of the body.

ELAPIDAE

Elapsoidea sundevallii decosteri Boulenger

Elapsoidea Decosteri Boulenger, 1888d, Ann. Mag. Nat. Hist. (6), **2**, p. 141: Delagoa Bay, Mozambique.
Elapsoidea Guentheri Günther (part: not of Bocage), 1895, p. 525.
Elapechis guentheri Boulenger (part: not of Bocage), 1896d, p. 359.
Elapsoidea sundevallii decosteri Loveridge, 1944q, p. 217 (revision).

♂ (A.M.N.H. 67763) Likabula River. 19.vi–18.vii.46.

Records. Shire Highlands (G).

Variation. Midbody scale-rows 13; ventrals 152; anal 1; subcaudals 22; upper labials 7, the third and fourth entering the orbit; preocular 1; postoculars 2; temporals 1 + 2.

Color. Being an adult, this specimen is almost uniformly black, retaining only the faintest trace of a single pair of white crossbands.

Size. Total length 600 (560 + 40) mm.

Naja haje haje (Linné)

Coluber haje Linné, 1758, Syst. Nat., ed. 10, p. 255: Lower Egypt.
Naja haje var. *annulifera* Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 624: west of Tete, Mozambique.
Naja haje Peters, 1882a, p. 137, pl. xx, figs. 7–8.
Naia haie Boulenger, 1891a, p. 308.
Naja haje haje Bogert, 1943, p. 288 (synopsis of races).

♂ (M.C.Z. 51566) west of Tete. 25.i.49.

Records. Shire Valley (B).

Native name of the Egyptian Cobra. *Chidiansana* (Nyungwe), which is very different from "*schibarampamba*," as recorded by Peters.

Variation. Midbody scale-rows 19; ventrals 194; anal 1; subcaudals 53; upper labials 7, sixth largest but none entering orbit; preocular 1; subocular 1 (3 in figured type of *annulifera*); postocular 1; temporals 1 + 2.

Color. Across 13 ventral scales on the neck of this topotype of *annulifera* is a jet black band which is sharply distinct from the otherwise uniformly white underside. To judge from Anderson's (1898, pp. 313–314) remarks, similarly marked specimens of this variable snake occur also in Egypt so that Peters (1882a) was probably correct in regarding his *annulifera* as untenable.

Size. Total length 416 (355 + 61) mm.

Diet. In its stomach was a freshly swallowed frog (*Rana o. oxyrhynchus*) that has been preserved.

Habitat. Under debris left by the shrinking waters of the Zambezi.

Naja nigricollis nigricollis Reinhardt

Naja nigricollis Reinhardt, 1843, Dansk. Vidensk. Selsk. Skrift., **10**, p. 269, pl. iii, figs. 5 & 7: Guinea. Günther, 1894a (1893), p. 618; Johnston, 1897, p. 362; 1898, p. 361a; Mitchell, 1946, pp. 29, 42.

Naja mossambica Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 625: Sena and Tete, Mozambique.
Naia nigricollis Boulenger, 1891a, p. 308; 1896d, p. 378; 1897e, p. 801.
Naja flava Johnston (not of Merrem), 1897, p. 362; 1898, p. 361a; Duff, 1906, p. 137 (spitting cobra).
Naja nigricollis nigricollis Bogert, 1940, p. 87; 1943, pp. 290, 300, figs. map.
Sepedon haemachaetes Shircore (not of Lacépéde), 1947, p. 200.

♂ (A.M.N.H. 67773) Kasungu. 19–23.viii.46.
♀ (A.M.N.H. 67764) Likabula River. 19.vi–18.vii.46.
♂, 4 ♀ ♀ (M.C.Z. 51568–72) Mtimbuka. 17–21.ii.49.
♀ (M.C.Z. 51573) Likabula River. 30.vii.48.
♂ (M.C.Z. 51574) Ruo River. 4.iv.49.
♀ (M.C.Z. 51567) near Tete. 21.i.49.

Records. Chiromo (J; M); Chitala River (M); Cholo (M. & Westrop); Karonga (Bogert); Karonga to Kondowe (B); Monkey Bay (M); Port Herald (M); Shire Valley (B); Zomba (B).

Native names of the Black-necked Cobra. *Liteo* or *litewo* (Yao); *mamba* (Nyanja); *mbadza* (Nyungwe) — this last is very different from the descriptive name "*njamudschidiandsâna*" recorded by Peters.

Variation. Midbody scale-rows 21–25; ventrals 180–204; anal 1; subcaudals 55–62; upper labials 6–7, third largest and entering orbit; preoculars 2; postoculars 3, rarely 2 (on left side only of M.C.Z. 51568); temporals 2 + 3, 2 + 4, 2 + 5, 2 +6, 3 + 4, 3 + 5 and 3 + 6. It appears doubtful whether the name *mossambica*, of which M.C.Z. 51567 is a topotype, can be used in a subspecific sense.

Size. Largest ♂ (A.M.N.H. 67764), 1165 (950 + 215) mm.; largest ♀ (M.C.Z. 51573), 1220 (1025 + 195) mm.

Breeding. On July 30, at Likabula River, this ♀ held 21 eggs measuring about 25 x 10 mm.

Diet. Her stomach held two freshly-swallowed *Bufo r. regularis* and the bones of a third; in another was a frog (*Phrynobatrachus natalensis*)

Parasites. A tick (*Aponomma* sp.) was preserved from the Likabula ♀.

Aestivation. Both this July 30 snake, and a ♂ taken February 17, held large deposits of fat, whereas another ♂ found wandering in the headboy's house on April 4, was lean and its stomach empty.

Habitat. On February 18 I captured a young ♀ beneath the thatch of a collapsed hut; on the 21st two others that were half buried in sandy soil beneath a fallen coconut palm. The Kasumbadedza snake was lying among dead leaves and rocks to one side of a sandy river bed

up which we were walking. When a babbler I shot fell from an overhanging tree to the river bed, a small African boy who was carrying my haversack dashed forward to retrieve the bird. In doing so he almost ran on to the snake which, rising with spread hood, gave him an awful fright. Afridi fled back behind me exclaiming that the reptile was "too big;" actually it was only 15 inches. The snake ejected its venom repeatedly when I went to pick it up.

Venom. The 20-inch spitting cobra that bit the toe of a six-year-old African boy near Fort Johnston, could not have been a "ringhals (*Sepedon haemachates*)" for *Hemachatus haemachatus* does not occur north of the Zambezi. Misled by this erroneous identification, Christensen & Waal (1947, p. 680) utilized true ringhals venom in the series of experiments they devised as a test of the efficacy of the treatment employed in the case of the bitten boy. Their conclusion as to its uselessness, however, is unlikely to have been affected by the difference in composition of the venom.

Naja melanoleuca Hallowell

Naia haie var. *melanoleuca* Hallowell 1857, Proc. Acad. Nat. Sci., Philadelphia, p. 61: Gabon.
Naia melanoleuca Boulenger, 1896d, p. 376.
Naja melanoleuca Mitchell, 1946, pp. 29, 42.

♂ (A.M.N.H. 67755) Likabula River. 19.vi–18.vii.46.
♂ (M.C.Z. 51575) Misuku Mountains. 29.ix.48.

Records. Port Herald (M); Shire Valley (B).

Native names of the Black-and-white-lipped Cobra. *Fumbe* (Misuku); *liteo* (Yao; but not specific); *mamba* (Ngoni and Nyanja; but not specific).

Variation. Midbody scale-rows 19; ventrals 212–214; anal 1; subcaudals 65–67; upper labials 7, sixth largest, third and fourth entering orbit; preocular 1; postoculars 3; temporals 1 + 2 or 1 + 3.

Color. Juv. ♂. Above, head brown; body and tail black. Below, chin, throat, and anterior third of body white crossed by two black bands each eight-ventrals wide; rest of body and tail jet black.

Ad. ♂. Above, head and neck yellow brown; body brown freely flecked with black; tail almost black, lighter on sides. Below, creamy white copiously speckled with black.

Size. Larger ♂ (A.M.N.H. 67755), 1708 (1420 + 288) mm.

Habits. With head concealed in the shoulder-high grass, the smaller cobra was lying stretched across a narrow footpath skirting the Matipa Forest. When Mrs. Loveridge came along she held the reptile down with her snail-collecting hoe. Promptly withdrawing its head from the grass, the snake spread its hood and raised its forepart. Despite this prompter towards a correct identification, my wife was too intent on securing the specimen—which she did with some help from her sister — to think of its being a cobra.

Dendroaspis angusticeps (Smith)

Naia angusticeps A. Smith, 1849, Illus. Zool. S. Africa, Rept., pl. lxx: Natal.
Dendraspis angusticeps ? Johnston, 1897, p. 362; 1898, p. 361a; Mitchell, 1946, pp. 28, 42.
Dendroaspis angusticeps Loveridge, 1950a, p. 3.

2 ♂♂, 1 ♀ (M.C.Z. 51576–8) Cholo Mtn. 14–20.iii.49.

Records. Chiromo (*fide* Mitchell ms. — though possibly a "Black" Mamba, with which this species has long been confused); Mzimba (Loveridge — specimen in Brit. Mus. det. H. W. Parker).

Native names of the Green Mamba. *Songo* (*kasongo* is diminutive: Manganja).

Variation. Midbody scale-rows 19; ventrals 209–216; anals 2; subcaudals 107–116 (tail-tip possibly missing for 107); upper labials 8, the fourth entering orbit; preoculars 2–3; postoculars 3–4; temporals 2 + 2 or 2 + 3.

Size. Larger ♂ (M.C.Z. 51576), 1804 (1400 + 404) mm. when killed; the body contracted 70 mm. in alcohol.

Habitat. This 71-inch mamba was killed in a hut, which it had presumably entered in search of rodents, for its stomach was empty.

Folklore. During my many visits to the forest capping Cholo Mountain, accompanied by two old men, selected as guides because of their familiarity with the forest, we frequently found the fallen fruits (allegedly poisonous to human beings) of the *mbobo* tree (*mbobobo* is the name usually applied to the larger mamba *D. polylepis*). These fruits, rather like oval avocado pears, were lying on the ground with their contents removed through a long narrow opening. The guides asserted that it is a *songo* snake that does this, and were unconvinced when I pointed out the impossibility and suggested that it was more likely to have been done by a rodent such as the little squirrel (*Parax-*

erus cepapi sindi) of which we saw a few in the forest canopy. The old men also said that native medicine men procure a medicine from the roots of the *mbobo* tree.

Dendroaspis polylepis polylepis (Günther)

Dendraspis polylepis Günther, 1864, Proc. Zool. Soc. London, p. 310: Zambezi River, Mozambique.
Dendrastis (*sic*) *angusticeps* Duff (not of Smith), 1906, p. 138.
Dendroaspis polylepis Loveridge, 1950a, p. 3.

♀ (M.C.Z. 51579) Mtimbuka. 11.ii.49.

Records. Karonga (*fide* Mitchell, who writes on 14.i.50 that he and his boys killed, but failed to preserve, a "nine-foot black mamba" they found high in a leafless tree); Murchison Cataracts (for Duff's description of a "crowing crested cobra" more properly belongs to this species); Mzimba (Loveridge's record of a specimen in the British Museum, det. H. W. Parker. It will be noted that two species of mamba occur at Mzimba, and the long confusion of the two is in part due to the frequency with which both kinds are found in the same locality).

Native name of the Black Mamba. *Songo* (as for *angusticeps*); *songwe* (Yao at Mtimbuka).

Variation. Midbody scale-rows 23; ventrals 261; anals 2; subcaudals 119; upper labials 8, the fourth entering orbit; preoculars 3; postoculars 4; temporals 2 + 3.

Color. This ♀ was a greyish brown (I have never yet seen a black mamba) of precisely the same shade as a boomslang (*Dispholidus typus*) brought in the same day. Small wonder that the natives fail to distinguish between these two tree snakes.

Size. Total length of ♀, 1557 (1230 + 327) mm.

Temperament. In the vicinity of Mount Hora, a rocky hill lying to the left of the main road running north from Mzimba, mambas appear to be particularly troublesome. Major D. N. Smalley, when Agricultural Officer for the Northern Province, told me that one, which was lying across the road, reared up as his car approached and struck the windscreen a resounding thwack. Mr. S. E. Illingworth, Assistant District Commissioner at Mzimba, had a similar experience except that the snake struck the door of the open touring car in which he and his family were driving. I heard of a third authentic case whose details I cannot now recall.

Replying to a query from me, Mr. W. J. Rangeley, then acting Provincial Commissioner stationed at Mzimba, wrote saying that the snake "I assume to be a Black Mamba is fairly common in this district. Its colour is a deep brownish black and its average length seems to be about eight to ten feet. When surprised it rears up about chest high. Bus drivers stop if they see one on the road for fear it may strike a passenger. These snakes are most commonly found in the rocky hills where I assume they feed on squirrels and rock rabbits." (ex. letter of 28.iii.49).

As at Mzimba, it seems probable that both species of mamba occur at Nchisi. Mr. Guy Muldoon, who lives nearby and frequently hunts on the mountain, tells me that once — but once only — he encountered a mamba which suddenly reared chest-high in front of him. He shot it with the .22 rifle he was carrying, and found the snake measured eight and a half feet.

One afternoon when we were at Nchisi, my headman Thomas, who had run back to the house for a bushknife he had forgotten, was hurrying after me when he encountered a big snake that came sliding down the eroded, rock-strewn hillside and out on to the footpath within six feet of him. The startled snake reared up (allegedly higher than Thomas' face, a statement that may be discounted) and faced him for a few seconds, then, dropping to the ground, it continued on downhill to a bush-choked ravine. In reply to my query Thomas was certain it spread no hood.

VIPERIDAE

Atractaspis bibronii rostrata Günther

Atractaspis rostrata Günther, 1868a, Ann. Mag. Nat. Hist. (4), **1**, p. 429, pl. xix, fig. 1: Zanzibar. Boulenger, 1891a, p. 308; 1896d, p. 514; Sternfeld, 1910a, p. 44, fig. 53.

Atractaspis bibronii Bogert (not of Smith), 1940, p. 106.

Records. Lake Nyasa (B); Mlanje Mountain (Bogert).

Remarks. I failed to obtain a specimen of the Zanzibar Burrowing Adder in Nyasaland, but take this opportunity of saying that data of specimens from south of the Zambezi supplied me by Dr. V. Fitz-Simons show that a preponderance of snakes possess 21 midbody scale-rows. For these the name *A. b. bibronii* A. Smith is available. Dr. Laurent (1945. Revue Zool. Bot. Afr., **38**, p. 338) was correct in reviving the name *rostrata* for East African examples of this snake, the majority of them having 23 or 25 midbody scale-rows.

Causus rhombeatus (Lichtenstein)

Sepedon rhombeatus Lichtenstein, 1823, Verz. Doubl. Mus. Berlin, p. 106: No locality.

Causus rhombeatus Boulenger, 1891a, p. 308; Günther, 1894a, (1893), p. 618; Boulenger, 1896d, p. 467; 1897e, p. 801; Johnston, 1897, p. 362; 1898, p. 361a; Bogert, 1940, p. 96; Mitchell, 1946, p. 42.

♀ (A.M.N.H. 67796) Zomba Plateau. 27.v–11.vi.46.
♀ (A.M.N.H. 67761) Likabula R. 19.vi–18.vii.46.
♀ (A.M.N.H. 67791) Cholo Mtn. 18.ix.–1.x.46.
♀ (M.C.Z. 51580) Chinunkha. 18.x.48.
♂, 3 ♀ ♀ (M.C.Z. 51581–4) Misuku Mtns. 27.ix.–5.x.48.
♂ (M.C.Z. 51585) Nchenachena. 25.x.48.
4 ♀ ♀ (M.C.Z. 51586–9) Cholo Mtn. 11–18.iii.49.
2 ♀ ♀ (M.C.Z. 51590–1) Likabula R. 2.viii.48.
♂ ♀ (M.C.Z. 51592–3) Ruo R., Mlanje Mtn. 2.iv.49.

Records. Blantyre Mission (B); Chitala River (M); Fort Johnston (J); Karonga (Bogert); Mandala, Blantyre (B); Mlanje Mtn. (Bogert); "Nyika Plateau" (B); Shire Highlands (G); Zomba (B).

Natives names of the Common Night Adder. *Kalelea* (Yao); *kasambwe* (Nyanja but generic); *luwando* (Misuku).

Variation. Midbody scale-rows 17–19; ventrals 138–146; anal 1; subcaudals 21–33 (extremes checked); upper labials 6, excluded from orbit; preoculars 1–2; suboculars 1–2; postoculars 1–2; temporals 2 + 3, rarely 2 + 2 or 2 + 4.

Color. While young snakes from Cholo Mountain had well-defined dorsal rhombs, an adult ♀ from the same locality is ashy drab with only a faint trace of markings; similar conditions prevail on nearby Mlanje. The normal black lateral streaks on the belly of this species, had spread extensively over the ventrals of the exceptionally big ♀ from the Misuku Mountains.

Size. Largest ♂ (M.C.Z. 51584), 527 (470 + 57) mm.; largest ♀ (M.C.Z. 51581), 846 (740 + 106) mm.; smallest ♀ (M.C.Z. 51587), 185 (170 + 15) mm. on March 3rd.

Breeding. On August 2, at Likabula, a ♀ held 26 eggs *ca.* 25 x 14 mm. On October 5, on Misuku Mountains, a ♀ held 22 eggs *ca.* 14 x 6 mm.

Diet. Toads (*Bufo r. regularis*) in the stomachs of Nchenachena and Likabula snakes; a frog (*Leptopelis bocagii*) in a Cholo adder.

Parasites. Ascarid worms (*Ophidascaris*, *Polydelphis*, and *Hexametra* spp.) in the alimentary tracts of night adders taken in the Misuku Mountains and at Likabula River.

Causus defilippii (Jan)
Plate 5, figure 2

Heterodon De Filippii Jan, 1862, Zool. Anat. Fisiol., **2**, p. 225: Africa.
Causus (*Heterophis*) *rostratus* Günther, 1863e, Ann. Mag. Nat. Hist. (3), **12**, p. 363: Ugogo, Tanganyika Territory.
Causus rostratus Günther, 1893 (1892), p. 555; Johnston, 1897, p. 362; 1898, p. 361a.
Causus defilippii Boulenger, 1896d, p. 469; Bogert, 1940, p. 99.

♂ (M.C.Z. 51594) Nchenachena. 22.xi.48.
♀ (M.C.Z. 51595) Chitala River. 15.xii.48.
3 ♂♂, 1 ♀ (M.C.Z. 51596–9) Ruo River. 8–10.iv.49.

Records. Mlanje Mtn. (Bogert); Shire Highlands (G); Zomba (B).

Native name of Defilippi's Night Adder. *Kasambwe* (Nyanja, but generic).

Variation. Midbody scale-rows 17; ventrals 114–128; anal 1; subcaudals 13–18; upper labials 6, excluded from orbit; preoculars 1–2; postoculars 2; suboculars 1–3; temporals 2 + 3.

Color. The Nchenachena snake resembled *resimus* and differed from any *defilippii* I have previously seen in being a dark velvety green ground color against which the rich black markings showed to advantage.

Size. Largest ♂ (M.C.Z. 51598), 360 (335 + 25) mm.; larger ♀ (M.C.Z. 51597), 413 (385 + 28) mm.; smallest ♂ (M.C.Z. 51596), 178 (166 + 12) mm. on April 4th.

Breeding. On December 15, at Chitala River, a ♀ held 6 eggs *ca.* 11 x 6 mm.

Parasites. Cestodes (U.S. Dept. Agric. 41284) from a Ruo snake await identification.

Bitis arietans arietans (Merrem)

Cobra lachesis Laurenti, 1768, Syn. Rept., p. 104: No locality.
Vipera (*Echidna*) *arietans* Merrem, 1820, Vers. Syst. Amphib., p. 152: Cape of Good Hope.
Clotho arietans Günther, 1893 (1892), p. 555.
Bitis arietans Boulenger, 1896d, p. 493; 1897e, p. 801; Johnston, 1897, pp. 359, 362; 1898, pp. 359, 361a; Duff, 1906, p 137; Mitchell, 1946, p. 42.
Bitis lachesis Bogert, 1940, p. 99.

♂ (A.M.N.H. 67779) Kasungu. 19–23.viii.46.
♂ (A.M.N.H. 67792) Cholo Mtn. 18.ix.–1.x.46.

2 ♀ ♀ (A.M.N.H. 67768–9) Likabula R. 19.vi.–18.vii.46.
♂ (M.C.Z. 51600) Misuku Mtns. 27.ix.48.
♂ (M.C.Z. 51601) Nchisi Mtn. 25.xi.48.
♂ (M.C.Z. 51602) Mwera Hill. 13.xii.48.
♂, 2 ♀ ♀ (M.C.Z. 51603–5) Chitala R. 14–18.xii.48.
2 ♂ ♂, 3 ♀ ♀ (M.C.Z. 51606–10) Mtimbuka. 8–18.ii.49.
2 ♂ ♂ (M.C.Z. 51611–2) Likabula R. 27.vii.48.
♂ (M.C.Z. 51613) near Tete, M. 21.i.49.

Records. Blantyre (M); Chiradzulu (B); Chiromo (M); Karonga (Bogert); Lake Nyasa (B); "Nyika Plateau" (B); Port Herald (M); Shire Highlands (G); Zomba (B).

Native names for Puff Adder. *Kipili* (Misuku); *lipili* (Yao); *mpili* (Chewa; Manganja; Nyanja; Ngoni).

Nomenclature. Laurenti's generic name *Cobra*, ignored by common consent for almost a century, was revived by Stejneger (1936b, p. 140) only to be suppressed by the International Commission on Zoological Nomenclature (1945, pp. 77–87. Opinion 188) on the grounds that strict adherence to the rules of priority would "result in greater confusion than conformity." In validating the use of *Bitis* Gray, 1842, the commission designated *Vipera* (*Echidna*) *arietans* Merrem as genotype.

Unfortunately in his appeal to the Commission, Parker did not raise the question of the subspecific name *lachesis* which, since 1936, has been used less than a dozen times. Yet the medical reasons for surpressing *Cobra* are involved, though admittedly to a slightly less extent, in the use of *lachesis* for what is probably the commonest viper in Africa with a distribution ranging from Morocco to the Cape. *Bitis arietans* has been consistently used in herpetological literature over 250 times between 1849 and 1949; to change it for a name long associated with the pit vipers of Tropical America is too pedantic for me to contemplate.

Trinomials are necessary as Parker (1949, p. 101) has separated Somali specimens whose subcaudals he found to be keeled distally. The subcaudals of Nyasaland Puff Adders are smooth, except in a young ♀ and ♂ (M.C.Z. 51603; 51606) whose distal subcaudals show slight keeling.

Variation. Midbody scale-rows 31–33; ventrals 127–140; anal 1; subcaudals 17–36; upper labials 12–15.

Size. Largest ♂ (M.C.Z. 51600), 935 (810 + 125) mm.; largest ♀ (M.C.Z. 51609), 688 (635 + 53) mm.

Sexual dimorphism. Subcaudals in ♀♀ 17–21, in ♂♂ 28–36; in addition the tails of the latter are proportionately longer.

Breeding. Data suggesting that young vipers are born in November were furnished by the finding in the garden at Chitala (mid-December) of three snakes so young that their umbilical scales were not always healed, their lengths ranged from 216 to 224 mm., while three from the garden at Mtimbuka (mid-February) ranged from 231 to 242 mm.

Diet. Two held rodent fur, apparently that of a house rat in the case of the 34-inch male which I found coiled beneath a palm frond at the edge of the Mtimbuka garden in which the three young were found.

Atheris nitschei rungweensis Bogert

Plate 5, figure 1

Atheris nitschei rungweensis Bogert, 1940, Bull. Am. Mus. Nat. Hist., **77**, p. 104, fig. 18: Rungwe Mountains, Tanganyika Territory.

2 ♂ ♂, 2 ♀ ♀ (M.C.Z. 51614–7) Misuku Mtns. 22.ix.–6.x.48.

Records. Not only do these specimens constitute the first record of the occurrence of *Atheris* in Nyasaland, but they involve a slight southerly extension of the generic range.

Variation. Midbody scale-rows 27–31; ventrals 156–164; anal 1; subcaudals 49–58; upper labials 10–12; interorbital scales across crown 11–13; scales between mental and first ventral.

The previous high for ventrals was 162, and for subcaudals 56 in the typical Central African race; from which *rungweensis* is distinguishable only by its keeled gulars, not so pronounced in the two smallest specimens listed above. For discussion *vide* Loveridge (1942e, p. 313).

Size. Larger ♂ (M.C.Z. 51614), 440 (370 + 70) mm.; larger ♀ (M.C.Z. 51615), 642 (550 + 92) mm.

Diet. A cricket frog (*Phrynobatrachus u. ukingensis*) had just been swallowed by one Rungwe Sedge-Viper which held the undigested posterior half of another in its stomach.

Habitat. All were taken on the fringes of Matipa Forest, the one just mentioned being on a sunny bank at the edge of swampy ground where cricket frogs were plentiful; another was beneath a stone near a stand of wild bananas in a gully; a third was taken beneath a bush at the forest-edge.

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APPENDIX I

Synoptic Keys to Assist in the Recognition of Nyasaland Reptiles

Key to the Orders of Nyasaland Reptiles

1. Body enveloped in a bony shell consisting of an upper (carapace) and lower (plastron) portion ..... Testudinata
(Tortoises & Turtles)

   Body not enveloped in a bony shell 2
2. Body protected by horny shields that on the back, and sometimes on the belly, overlie bony plates; anal opening longitudinal ..... Crocodylia[1]
(Crocodiles)

   Body protected chiefly by scales (fused in worm lizards) or granules; anal opening transverse 3
(Squamata)
3. The two halves of the lower jaw united by a suture; most (but not all) species have a movable eyelid and four limbs (some are limbless) .. Sauria
(Lizards and Chameleons)

   The two halves of the lower jaw united by a more or less elastic ligament; eyelids transparent. immovable; no limbs ..... Serpentes
(Snakes)

Key to the Tortoises and Turtles of Nyasaland

1. Upper shell covered with smooth or pitted skin; snout projecting as a soft proboscis ..... *C. frenatum*
(Zambezi Mud-Turtle)

   Upper shell covered with horny shields; snout not projecting as a soft proboscis 2
2. Neck hidden when head is withdrawn into shell 3

   Neck fully exposed (by being bent to one side) when head is sheltering beneath shell 4
3. Shell height included in its length from 1.61 to 2.07 times; posterior portion of carapace immovable ..... *T. p. babcocki*
(Eastern Leopard Tortoise)

   Shell height included in its length from 2.14 to 2.58 times; posterior portion of carapace *in adults only* movable by a leathery hinge anterior to each hind limb ..... *K. b. belliana*
(Eastern Hinged Tortoise)
4. Anterior lobe of plastron immovable; pectoral shields participating equally with abdominals on bridge ..... *P. s. subrufa*
(Southern Marsh-Terrapin)

[1] Only one species in Nyasaland, *C. niloticus*.

Anterior lobe of plastron movable in adults; pectoral shields almost excluded from bridge by abdominals.....5

5. Plastron entirely black, entirely yellow, or yellow with darker infuscations, the latter *not* forming a sharply defined angular pattern round the periphery; its anterior lobe *always* longer than the suture between the abdominals; posterior margin of carapace usually rounded; narrowest interorbital width equal to, or slightly longer, or slightly shorter than the suture between the supraorbitals.....*P. subniger*
(Black Terrapin)

Plastron yellow (white) broadly edged with black, the latter forming a sharply defined angular pattern round the periphery (sometimes blurred or masked in old individuals with a carapace length of 250 mm. or more); its anterior lobe longer than the suture between the abdominals (equal to or slightly shorter in old specimens); posterior margin of carapace sharply serrate except in very old terrapin; narrowest interorbital width only two-thirds the length of the suture between the supraorbitals.....
.....*P. sinuatus*
(Serrated Terrapin)

Key to the Families of Lizards of Nyasaland [1]

1. Limbs present; body not unusually elongate.....2
Limbs absent or vestigial; body attenuated.....9

2. Upper surface of head covered with granules or tubercles.....3
Upper surface of head covered with symmetrical shields.....6

3. Digits dilated, with subdigital scansors or lamellae; eyelids immovable; dentition pleurodont.....GEKKONIDAE
(Geckos)

Digits slender, without subdigital scansors; eyelids movable.....4

4. Tongue short, broad, covered with villose papillae, neither deeply divided nor withdrawable into a sheath, in life rarely protruded except when drinking; dentition acrodont.....AGAMIDAE
(Agamas)

Tongue very long and slender, not covered with papillae.....5

5. Tongue cylindrical, extensile, projectile, its tip club-shaped; dentition acrodont; digits opposed for grasping branches..CHAMAELEONIDAE
(Chameleons)

Tongue elongate, its tips deeply forked, threadlike, in life constantly flickering in and out like those of a snake, withdrawable into a sheath; dentition subpleurodont; digits in a single plane.....VARANIDAE
(Monitors)

[1]For which country alone the definitions are applicable and not necessarily elsewhere in the continent. Nor has it been deemed essential to adhere strictly to the usual systematic sequence of families as employed elsewhere in this paper.

6. Tongue short, covered with hair-like papillae, its tip entire or feebly nicked, scarcely protractile; femoral pores present in both sexes but sometimes indistinct in females; tail regularly ringed with whorls of strongly keeled or spinose scales ..... CORDYLIDAE
(Girdled Lizards)

Tongue moderately long, covered with scale-like papillae anteriorly, plicae posteriorly 7

7. Body scales smooth, glossy, imbricate, with underlying bony plates; no lateral fold; no femoral pores ..... SCINCIDAE (part)
(Skinks)

Body scales more or less rugose, keeled or granular; femoral pores usually present, at least in males 8

8. Bony plates underlying the large shields or scales covering the back; side with a well-defined granular fold ..... GERRHOSAURIDAE
(Plated-Lizards)

No bony plates underlying the granular scales or plates covering the back; side without a well-defined fold along the flank ..... LACERTIDAE
(Typical Lizards)

9. Appearance snake-like; eyes distinct; a lower eyelid; body covered with glossy, overlapping scales; color dark olive or iridescent black .....
SCINCIDAE (part) — (Skinks)

Appearance worm-like; eyes, if distinguishable, concealed beneath a head shield; body covered with squarish segments of soft skin; putty colored or pinkish white ..... AMPHISBAENIDAE
(Worm-Lizards)

Key to the Geckos of Nyasaland

1. Distal digital joint compressed and rising angularly from within, or from the end of, the digital expansion 2

Distal digital joint neither compressed nor rising from *within* the digital expansion, which is furnished below by numerous oblique or transversely dilated scansors and lamellae; range: Africa south of equator 7
(*Pachydactylus*)

2. Free distal digital joint long, rising from within the end of the digital expansion; thumb present and clawed; postanal slits present in both sexes; tail tip without oblique scansors or lamellae; pupil vertical; range: Africa south of 20° N., etc. 3
(*Hemidactylus*)

Free distal digital joint short, rising from the end of a strongly dilated discoid expansion, digits subcylindrical at base; thumb rudimentary, clawless; postanal slits absent in both sexes; *original* tail with oblique scansors or lamellae beneath tip; pupil round; range: Africa from about 15° N. to 30° S., etc. 4
(*Lygodactylus*)

3. Scansor rows under first toe 5–7, under fourth toe 7–11; upper labials 9–14; lower labials 7–11; preano-femoral pores in males 24–60; length from snout to anus in adults 50–86 mm.; egg 10–12 mm. in diameter, usually cemented together in pairs; range: Tropical Africa; Madagascar; Mauritius; West Indies..... *H. mabouia*
(House Gecko)

Scansor rows under first toe 4–6, under fourth toe 6–9; upper labials 8–12; lower labials 7–11; preano-femoral pores in males 24–34; length from snout to anus in adults 41–53 mm.; egg 8–9 mm. in diameter, each egg separate and distinct; range: East Africa from Kenya to Mozambique; Madagascar; Aldabra Islands; Seychelle Islands..... *H. mercatorius*
(Palm Gecko)

4. Mental (chin shield) normally with deep lateral fissures resulting from fusion with a former large postmental.....5
Mental (chin shield) entire, without trace of lateral fissures; subcaudals with median row strongly enlarged transversely.....6

5. Subcaudals equal, the median row *not*, or but irregularly and occasionally enlarged; snout broad; preanal pores in males 4–7; range: Africa south of the equator, i.e. in the east northwards to central Kenya..... *L. capensis*
(Cape Gecko)

Subcaudals with median row strongly enlarged transversely; snout elongate; preanal pores in males 4–8; range: Tanganyika Territory south to Mozambique (as yet *unknown* from Nyasaland)..... *L. g. grotei*
(Grote's Gecko)

6. Rostral entering nostril; latter situated above the suture between rostral and first labial; postmentals 1–3; throat of ♂ and ♀ with a series of dark lines converging from labials to base of throat, the anterior forming two V-shaped marks the apex of the second prolonged posteriorly as a single line; range: southern Tanganyika Territory and Nyasaland.. *L. a. angularis*
(Angle-throated Gecko)

Rostral almost invariably separated from nostril; latter situated above first labial so *posterior* to (rarely above) the suture between rostral and first labial; postmentals 3; throat of ♂ adult uniformly black, only rarely showing traces of Λ-chevrons, throat of ♀ normally white, only occasionally showing faint obsolescent markings; range: (? Somalia) Kenya Colony (coastal belt from Mombasa) south to Tanganyika Territory and adjacent islands. Northern Rhodesia and adjacent Belgian Congo; Mozambique (its distribution complicated by its transportation in egg form along coast, rivers, and railways, through human agency; as yet *unknown* from Nyasaland)..... *L. p. picturatus*
(Yellow-throated Gecko)

7. Scansors under fourth toe 3–7; cheeks not or but slightly swollen; length from snout to anus in adults less than 70 (30–50) mm.; nape and back showing 3 broad, black-edged, cream-colored crescentic markings; original

tail with 7 more; range: Nyasaland.....*P. c. oshaughnessyi*
(Cape Maclear Gecko)

Scansors under fourth toe 8–13; cheeks swollen; length from snout to anus of adults over 70 (75–95) mm.; back and tail usually showing irregular, wavy, brown or black crossbars, those on back posteriorly edged with white; range Belgian Ruanda and Tanganyika Territory south to Mozambique, west to Angola, etc.....*P. b. turneri*
(Zambezi Gecko)

Key to the Agamas of Nyasaland

1. Some dorsolateral scales greatly enlarged.....2
   All dorsolateral scales uniform; occipital (pineal eye) scale larger than those surrounding it; scales on upper surface of tibia subequal.....3
2. Occipital scale no larger than those surrounding it; enlarged dorso-lateral scales irregularly scattered among the others; scales around midbody 100–133; scales on upper surface of tibia unequal; fifth toe extending far beyond first.....*A. cyanogaster*
   Black-necked Agama

   Occipital scale larger than those surrounding it; enlarged dorso-lateral scales arranged in more or less longitudinal rows; scales around midbody 72–90; scales on upper surface of tibia subequal; fifth toe usually extending as far as first.....*A. h. armata*
   Zambezi Spiny Agama
3. Scales around midbody (69) 72–94; lower temporal area between angle of jaw and tympanum covered with small, but not minute, scales, restricted; head of adult male blue and/or brown, throat rich blue (occasionally with a dusky basal blotch).....*A. m. mossambica*
   Mozambique Tree-Agama

   Scales around midbody 96–118; lower temporal area between angle of jaw and tympanum covered with minute scales, extensive; head of adult male red and/or brown, throat brown-orange to orange-red with a conspicuous dark blue basal patch (throats of immature males and females have longitudinal dusky streaks, those of juveniles under 56 mm. in length from snout to anus, white).....*A. k. kirkii*
   Kirk's Rock-Agama

Key to the Chameleons of Nyasaland

1. Tail almost as long as, or longer than, the head and body.....2
   Tail not more than a quarter the length of the head and body.....6
2. Throat, chest and belly with a median crest of enlarged white scales....3
   Throat, chest and belly without a median crest of enlarged white scales..5
3. Each skin-flap on side of head with 4–5 scales, including small marginals,

across it from front to rear; total length of adults less than a foot; range: Shire Highlands.....*C. d. isabellinus*
(Shire Flap-necked Chameleon)

Each skin-flap on side of head with 6–8 (exceptionally 4–5) scales, including small marginals, across it from front to rear.....4

4. Total length of adults less than a foot; range: *in Nyasaland* at altitudes usually over 1,700 ft.....*C. d. dilepis*
(Common Flap-necked Chameleon)

Total length of adults more than a foot; range: *in Nyasaland* at altitudes usually under 1,700 ft.....*C. d. petersii*
(Giant Flap-necked Chameleon)

5. Snout bearing a prominent horn (or knob in very young); back of head with a pair of movable (except in very young) skin-flaps; range: Tanganyika Territory south to Mozambique and Nyasaland.....*C. melleri*
(Giant One-horned Chameleon)

Snout without trace of a horn; back of head without skin-flaps; range: Nyika Plateau above 7,000 ft.....*C. g. nyikae*
(Nyika Goetze's Chameleon)

6. No pit in groin.....7

A pit in groin as well as one in axilla; interorbital region with a curved non-angular, transverse series of enlarged granules.....8

7. No pit in axilla; snout terminating in a more or less distinctly flexible rostral process; interorbital region with a somewhat angularly arranged, transverse series of enlarged granules; vertebral line weakly crenulate, the granules on the humps not, or but slightly, enlarged; size moderate; range: montane forests north and east of Lake Nyasa as far south as Nchisi....
B. nchisiensis
(Pitless Short-tailed Chameleon)

A pit in axilla; snout without a flexible rostral process; interorbital region *without* a transverse series of enlarged granules; vertebral line not or but indistinctly crenulate, scattered with numerous, strongly-enlarged, conical tubercles as on flanks; size very small; range: Shire Highlands of Nyasaland; Mozambique.....*B. b. brachyura*
(Nyasaland Short-tailed Chameleon)

8. Humps along crenulated vertebral line covered with granules scarcely larger than those in the intervening hollows; supraciliary ridge *with* a single small, flexible tubercle or horn-like process (not shown in figure); range: lower slopes of Shire Highlands, Nyasaland.....*B. p. platyceps*
(Flat-headed Short-tailed Chameleon)

Humps along crenulated vertebral line formed of much-enlarged, spine-like granules; supraciliary ridge *without* a raised tubercle or horn-like process, or but slightly indicated; range: upper slopes of Mlanje Mountain, Nyasaland.....*B. p. carri*
(Plateau Short-tailed Chameleon)

Key to the Skinks of Nyasaland

1. Lower eyelid movable, in its centre a large transparent disk; limbs well developed 2
   Lower eyelid, if movable,[1] scaly; if immovable, then transparent and covering the eye like a watchglass; limbs present or absent 11
2. Subocular bordering the lip 3
   Subocular separated from the lip by labials 10
3. Suboculars not narrowed below but resembling the labials except for its larger size; scales on soles not spinose 4
   Subocular distinctly narrowed below; scales on soles sharply spinose 6
4. Midbody scale-rows 44–48; adult males lack the light longitudinal lines characteristic of the blue-tailed females and young; habitat restricted to rocky outcrops ..... *M. q. obsti*
   (Tanganyika Five-striped Skink)
   Midbody scale-rows less than 42 5
5. Midbody scale-rows 34–36; body stout; tail moderate; habitat chiefly virgin-forest-edge ..... *M. m. comorensis*
   (Comoro Spotted-lip Skink)
   Midbody scale-rows 30–32; body slender; tail very long; habitat chiefly dry savanna forest ..... *M. m. boulengeri*
   (Makonde Spotted-lip Skink)
6. No light longitudinal line on side; midbody scale-rows 36–40 (though 34–42 for *striata* from the entire continent) 7
   A conspicuous light longitudinal line on side; midbody scale-rows 30–36 . 9
7. Back olive or brown with or without black flecks, if traces of dorsolateral line present it is scarcely distinguishable; size small; habitat in arid country near rocky outcrops ..... *M. lacertiformis*[2]
   (Lizard-like Skink)
   Two or three conspicuous light lines on back 8
8. Two light dorsolateral lines on back ..... *M. s. striata* (part)
   (Common Two-striped Skink)
   Three light longitudinal lines on back; midbody scale-rows 36–38; habitat in grasslands at 6000 feet on Lichenya Plateau, Mlanje Mtn. .....
   M. b. mlanjensis
   (Mlanje Three-striped Skink)
9. Centre of nostril *directly above* the vertical of the suture between rostral and first labial; supraciliaries usually 4, rarely 5; midbody scale-rows 34–36; habitat in grasslands at 7000 feet on Nyika Plateau . . *M. v. nyikae*
   (Nyika Variable Skink)

[1] Except in the snake-like *Riopa johnstoni* which is characterized by vestigial limbs, see 16.

[2] Boulenger (1887a, pp. 154, 159) erred in saying this species has non-spinous soles. In the above key *M. s. ellenbergeri* Chabanaud would fall here, but this Zambezi species is unknown from Nyasaland. From *lacertiformis* it is immediately distinguished by the presence, at least anteriorly, of a conspicuous broad black lateral band, and its much larger size.

Centre of nostril *posterior to* the vertical of the suture between rostral and first labial; supraciliaries usually 5, rarely 4; midbody scale-rows 30–34; habitat from sea level to 6000 feet on Mlanje Mountain....*M. v. varia*
(Tete Variable Skink)

10. Three light longitudinal lines on back, which is heavily spotted like the sides; underside (except in young) plumbeous; habitat in grasslands at 7000 feet on Nyika Plateau.....*M. hildae*
(Nyika Three-striped Skink)

Two conspicuous light dorsolateral lines on an otherwise usually uniformly brown back; underside white; habitat ubiquitous but chiefly on huts, houses, and trees from sea level to about 6000 feet..*M. s. striata* (part)
(Common Two-striped Skink)

11. Lower eyelid immovable, transparent, covering the eye like a watchglass; size small; limbs well developed; habitat principally in dry bush, especially among dead leaves.....*A. wahlbergii*
(Wahlberg's Snake-eyed Skink)

Lower eyelid movable, scaly (except in *Riopa johnstoni*); limbs present or absent.....12

12. Limbs well developed though relatively short.....13

Limbs minute or entirely absent; body elongate, serpentiform.....16

13. Nasal opening between the rostral and a very small nasal shield which may be reduced to a narrow ring.....14

Nasal opening separated from the rostral by a nasal shield; midbody scale-rows 24–28.....15

14. Midbody scale-rows 22; limbs five-toed; lamellae beneath fourth toe 11; range: Mlanje Mountain south to Vumba Mountain, Southern Rhodesia .....*S. arnoldi*
(Arnold's Skink)

Midbody scale-rows 24; limbs four-toed; lamellae beneath fourth toe 3; range: Uluguru Mountains and eastern Tanganyika Territory south to Mlanje.....*S. t. tetradactylus*
(Four-toed Skink)

15. Nasal opening between three shields, viz. a supranasal, anterior nasal, and postnasal; habitat in loose soil beneath logs or vegetable debris throughout East and South Africa.....*R. sundevallii*
(Sundevall's Skink)

Nasal opening between two shields, viz. a supranasal that has fused with the anterior nasal, and a postnasal; habitat as last, but range is only from Somalia south to Nyasaland.....*R. m. modesta*
(Mpwapwa Skink)

16. Lower eyelid with an undivided transparent disk; limbs vestigial, the anterior ending in a single point, the posterior in two points; habitat: in grasslands of the Nyika Plateau.....*R. johnstoni*
(Johnston's Skink)

Lower eyelid scaly; no limbs 17

17. Below from chin to anus longitudinally striped with brown due to a dark spot in the centre of each scale, but old individuals may be uniform white; habitat in rich loam or damp soil in the Misuku Mountains .....
M. a. misukuensis
(Misuku Limbless Skink)

Below from chin to anus uniformly black like the tail and entire upper surface; range: Misuku Mountains south to the Zambezi River . . *M. a. ater*
(Black Limbless Skink)

Key to the Gerrhosauridae of Nyasaland[1]

1. Ventrals transversely across midbelly 14–20; dorsals transversely 28–34, longitudinally 50–56; lamellae beneath fourth toe 18–23; range: Orange Free State and Transvaal north to Mozambique and Nyasaland .....
G. v. validus
(Giant Plated-Lizard)

Ventrals transversely across midbelly 8–10; along either side of back a black-edged white or (light) line 2

2. Ventrals in 10 rows across midbelly 3

Ventrals in 8 rows across midbelly 4

3. Above, head only buff though back anteriorly largely so, while posteriorly, as also on sides and tail, many scales are streaked with black or dark brown among which large buff blotches or spots are prominent; belly usually streaked with dusky; range: Zululand and Transvaal north to Morogoro, Tanganyika Territory ..... *G. m. grandis*
(Greater Plated-Lizard)

Above, head and body uniform buff or fulvous brown; belly uniform yellowish; range: Northern Rhodesia (?) and Tete, Mozambique up east coasts of Tanganyika Territory and Kenya Colony; also Zanzibar .....
G. m. major[2]
(Great Plated-Lizard)

4. Supraciliaries 4, very rarely 3 or 5; prefrontals broadly in contact, very rarely separated; distance from end of snout to back of ear included in distance from snout to anus 3.25 (hatchling) to 5 (adults) times; basic coloring usually sandy rufous-brown; range: Bechuanaland and Transvaal north to Kenya highlands and west to Gaboon ..... *G. n. nigrolineatus*
(Black-lined Plated-Lizard)

Supraciliaries 5, very rarely 4 or 6; prefrontals separated, rarely in contact; distance from end of snout to back of ear included in distance from snout to anus 4.8 (young) to 6 (adults) times; basic color usually dark olive;

[1] In counting ventrals omit outermost row of half-sized ones; dorsals are counted longitudinally from the back row which is *in line with* the posterior edge of the anal, right up to the large head shields; meticulous precision is required in measuring head lengths as a millimetre error may lead to wrong conclusions.

[2] As yet unknown from Nyasaland.

range: Cape Province east to Natal, north to Northern Rhodesia, Mozambique and Nyasaland ..... *G. f. flavigularis*
(Yellow-throated Plated-Lizard)

Key to the Lacertidae of Nyasaland

1. Frontoparietals absent; a double series of large, smooth, transverse, plate-like shields extending from nape along back and tail; toes serrated laterally on basal half; tail much depressed and fringed laterally; habitat arboreal; range: Tanganyika Territory south to Mozambique ..... *H. g. laevis*
(Eastern Tree-Lizard)

   Frontoparietals present; no vertebral series of greatly enlarged, plate-like shields; toes not serrated laterally; tail cylindrical, long and tapering; habitat terrestrial 2

2. Dorsal scales smooth, granular, juxtaposed; subdigital lamellae smooth or tubercular; range: Nyasaland and Mozambique ..... *N. i. ornata*
(Ornate Scrub-Lizard)

   Dorsal scales keeled, not granular, either juxtaposed or imbricate; subdigital lamellae keeled 3

3. Collar well-developed; nostril between 3–4 nasals and the first labial, or separated from latter by a narrow rim; range: Tanganyika Territory south to Mozambique, west to Southern Rhodesia ..... *L. johnstoni*
(Johnston's Scrub-Lizard)

   Collar absent; nostril between 2–3 nasals only 4

4. Frontonasal single; subocular usually bordering the lip; midbody scales *and* ventrals 34–38 (40); femoral pores 8–15 on either limb; range: Nyasaland south to Zululand, west to Transvaal, north to Belgian Congo .....
I. capensis
(Smith's Rough-scaled Sand-Lizard)

   Frontonasal longitudinally divided; subocular not bordering the mouth; midbody scales *and* ventrals 44–50 (58); femoral pores 12–17 on either limb; range: Tanganyika south to Zululand, west to Southwest Africa ....
I. squamulosa
(Peter's Rough-scaled Sand-Lizard)

Key to the Genera of Amphisbaenidae Likely to Occur in Nyasaland

1. Snout feebly compressed or rounded; nostrils lateral; no gular fold; pectoral segments (scales) not enlarged; a vertebral line .... *Amphisbaena*[1]
   Snout depressed, sharp-edged, shovel-shaped; nostrils inferior; a gular fold; pectoral segments (scales) enlarged but subject to subdivision; no vertebral line 2

2. Tail bluntly rounded; preanal pores present or absent ..... *Monopeltis*[2]
   Tail abruptly truncate, ending in a callous pad; preanal pores absent ....
Tomuropeltis[3]

[1] No species of *Amphisbaena* or *Chirindia* have been recorded from the Nyasaland Protectorate as yet, though occurring in adjacent territories.

[2] *Monopeltis sphenorhynchus* Peters of the Shire Valley is the sole species as yet reported and of its distribution little is known.

[3] *Tomuropeltis* Laurent is the name applicable to the worm-lizards referred to *Dalophia* Günther in my (1941a, p. 428) revision except for the genotype *welwitschii* which Laurent has shown to be a *Monopeltis*.

Key to the Cordylidae of Nyasaland

1. Back covered with rows of large rugose scales; tail covered with whorls of strongly spinous scales; femoral pores 5–8, present in both sexes; range: Kenya Colony south to Mozambique and Southern Rhodesia..... *C. c. tropidosternum*
(Eastern Girdle-tail)

   Back covered with small, smooth granules; tail covered with whorls of rugose or keeled scales; femoral pores 18–21 (?25), present at least in males.....2

2. Upper labials anterior to the subocular 4; ventrals in 12 rows across the belly; femoral pores present in both sexes; range: riverine boulders on slopes of Mlanje Mountain.....*P. mitchelli*
(Mlanje Flat-Lizard)

   Upper labials anterior to the subocular 5–6; ventrals in 18 rows across the belly; femoral pores present in males only; range: rocky terrain in savanna near Mpatamanga Gorge.....*P. g. nyasae*
(Mpatamanga Flat-Lizard)

Key to the Varanidae of Nyasaland

1. Nostril round or oval, slightly nearer the eye than the end of the snout; canthus rostralis angular; digits moderately elongate; build slender; range: Africa exclusive of arid areas in the northwest and southwest, also excepting the western forested areas where the race *ornata* occurs..... *V. n. niloticus*
(Common Water-Monitor)

   Nostril an oblique slit, much nearer the eye than the end of the snout; canthus rostralis rounded; digits relatively short; build robust.....2

2. Nuchal (nape) scales, without surrounding disk, distinctly larger than those on occiput and back; midbody scale-rows 122–154; ventrals longitudinally from collar fold to level of hind limbs 85–100; range: Ethiopia and Somaliland south to the Zambezi River, Mozambique[1]..... *V. e. microstictus*
(Eastern Savanna-Monitor)

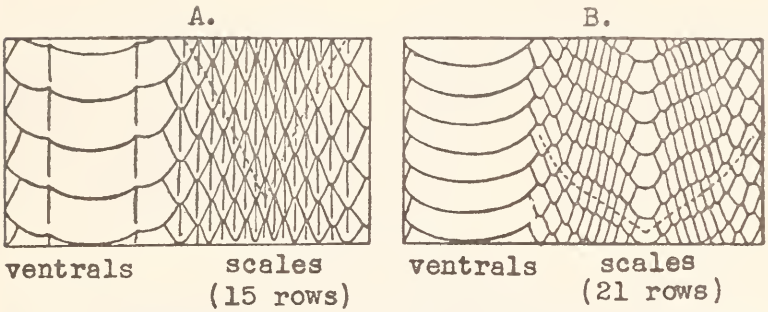
   Nuchal (nape) scales, without surrounding disk, not or but slightly larger than those on occiput and back; midbody scale-rows 133–167; ventrals longitudinally from collar fold to level of hind limbs 85–110; range: Africa south of the Zambezi and Kunene Rivers..... *V. e. albigularis*
(White-throated Savanna-Monitor)

[1] Possibly the young resemble the southern form, see text; much remains to be done to elucidate the limits of range.

Key to the Families of Snakes Found in Nyasaland

1. Body encircled by small scales more or less uniform in size; 3 or 4 scales immediately in front of anus; eye, when distinguishable, beneath a shield . 2
   Body not encircled by small scales owing to presence on belly of a longitudinal series of transversely enlarged plates known as ventrals (see fig. 1); 1 or 2 scales immediately in front of anus; eye beneath a transparent scale . 3
2. Ocular shield not bordering mouth (see fig. 2); 18 or more scales around middle of body; tail as long as, or only slightly longer than, broad . . . . . TYPHLOPIDAE (Blind-Snakes)
   Ocular shield bordering mouth (see fig. 3); 14 scales around middle of body; tail three times as long as broad at the base . . . . LEPTOTYPHLOPIDAE (Worm-Snakes)
3. Ventral shields narrower than the body; supraocular, if distinct, broken up into two or more shields . . . . . BOIDAE (Boas & Pythons)
   Ventral shields as broad as, or almost as broad as, the body; supraocular, if distinct[1], single (see fig. 4) 4
4. No enlarged poison fangs at front of upper jaw . . . . . COLUBRIDAE (ordinary Snakes)
   One or more pairs of enlarged poison fangs at front of upper jaw 5
5. Poison fangs immovable, not enclosed in a large sheath of membrane . . . . . ELAPIDAE (Cobra, Mambas, etc.)
   Poison fangs movable and very large, so folded back when not in use, encased in a large sheath of membrane . . . . . VIPERIDAE (Adders & Vipers)

[1] Distinct and large in all East African colubrids and elapids, but absent in the puff adders and certain other vipers.



Scaling of thickest part of body. *A. Gastropyxis smaragdina*, with keeled scales and bicarinate ventral shields on belly. *B. Boiga blandingii*, with oblique scales and enlarged vertebrals, ventrals not keeled. Figs. 1-4 after Boulenger.

Glossary or Reference to Terms Employed

Anal, the shield immediately in front of the anus.
Chin-shields, now called sublinguals (fig. 4).
Frontal (fig. 4).
Internasal (fig. 4).
Loreal (fig. 4).
Labial, one of several scales bordering the upper or lower lips.
Lower labial (fig. 4).
Mental or symphysial (fig. 4).
Midbody scales, those, other than ventral shields, encircling the body at a point midway between snout and anus (figs. 1A, 1B).
Nasal (figs. 2, 3, 4).
Nostril, the aperture situated in a nasal or between scales.
Ocular (figs. 2, 3).
Parietal (fig. 4).
Postocular (fig. 4).
Prefrontal (figs. 2, 3, 4).
Preocular (figs. 2, 4).
Rostral (figs. 2, 3, 4).
Subcaudals, the series of scales beneath the tail.
Sublinguals, preferred name for chin-shields (fig. 4).
Subocular (fig. 4).
Supraoculars (figs. 2, 3, 4).
Symphysial, alternative name for mental (fig. 4).
Temporal (fig. 4).
Upper labial (fig. 4).
Ventral (fig. 1).

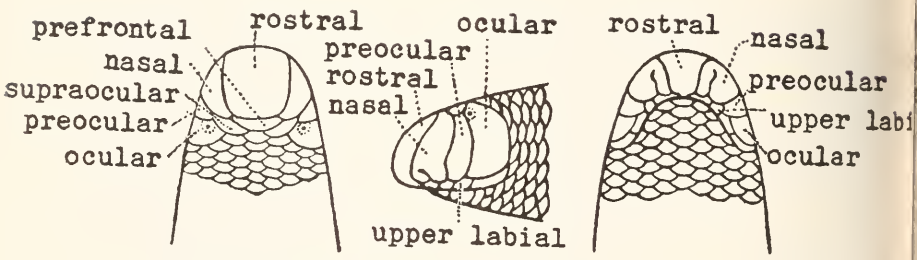
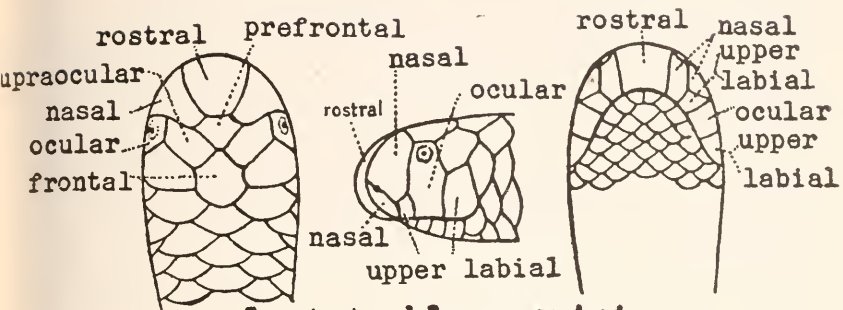
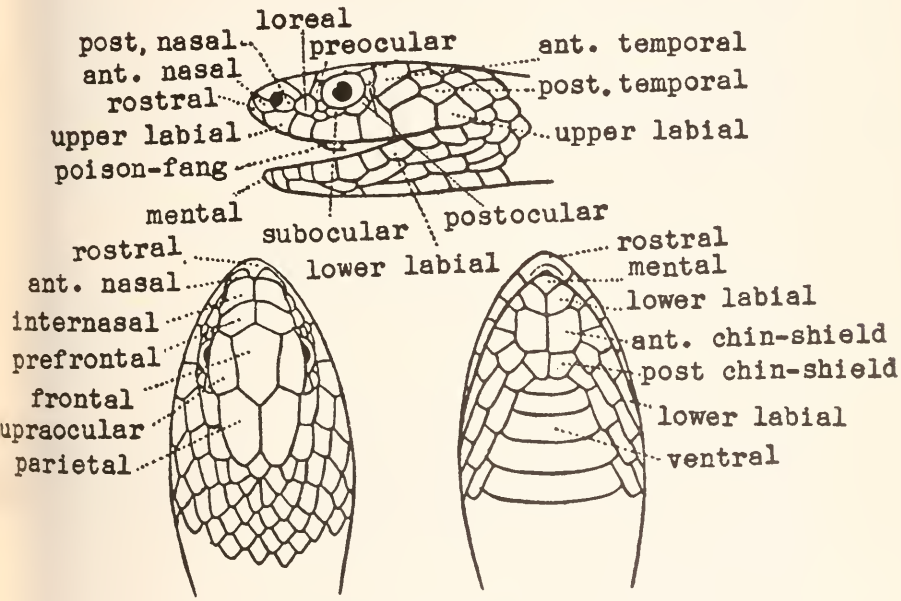


Fig. 2



Leptotyphlops emini.

Fig. 3



Causus rhombeatus.

Fig. 4

Key to the Blind Snakes (Typhlopidae) of Nyasaland

Midbody scale-rows 34 (30–38); snout rounded in young, but with sharply angular edge in adults; midbody diameter 24–40 times in total length; color highly variable; range: in East Africa from Kenya Colony south to the Zambezi..... *T. s. mucruso*
(North Zambezi Blind-Snake)

Midbody scale-rows 22–24; snout rounded throughout life; midbody diameter 44–76 times in total length; color plumbeous above, indistinguishable from some phases of *mucruso;* range: ? southeastern Tanganyika Territory south to the Zambezi..... *T. t. obtusus*
(Shire Blind-Snake)

Key to the Worm Snakes (Leptotyphlopidae) of Nyasaland

Rostral shield in contact with the supraocular; color in life black (fades to brown if exposed to light); midbody diameter 42–74 times in total length; range: obscure, as thought to be south of the Zambezi with *c. conjuncta* north of river..... *L. c. distanti*?
(Distant's Worm-Snake)

Rostral shield separated from the supraocular; color in life flesh pink (fades to white after death); midbody diameter 46–81 times in total length; range: Somaliland south through Mozambique, Nyasaland and Northern Rhodesia to Tete, on the Zambezi (its type locality)..... *L. longicauda*
(Long-tailed Worm-Snake)

Key to the Pythons (Boidae) of Nyasaland

Though Africans have names for, and profess to distinguish several of the color phases, and while Europeans frequently miscall it "boa," herpetologists recognize but one species in Nyasaland..... *P. sebae*
(Rock or Water-Python)

Key to the Ordinary Snakes (Colubridae) of Nyasaland

(Though I have endeavoured to devise a key without recourse to dentitional characters, which are admittedly difficult to discern at times, this has not always been possible. When in doubt follow up both alternative branches of the key and then consult the main body of this paper for further details concerning the species of final choice).

1. A loreal shield present between postnasal and preocular; subcaudals in pairs..... 2
   No loreal shield normally (present in 4 per cent of *Duberria* which is recognizable by a combination of an entire nasal, low number of ventrals and divided subcaudals)..... 18

2. Anal entire (occasionally divided in *Telescopus*); pupil vertically subelliptic (except in *Lycodonomorphus* where it is sometimes subcircular or even round) 3
   Anal divided; pupil round or horizontal (horizontal only in *Thelotornis*) .. 9
3. Scales on back smooth 4
   Scales on back keeled 8
4. Snout rounded; prefrontals and internasals paired 5
   Snout with angular horizontal edge; prefrontal single 17
5. Midbody scale-rows 25–33 ..... *B. l. lineatus*
   (House-Snake)
   Midbody scale-rows 17–21 6
6. No pair of enlarged grooved fangs situated below the posterior border of the eye 7
   A pair of enlarged grooved fangs situated below the posterior border of the eye, separated by an interspace from the preceding teeth 23
7. Nostril directed upwards from between two nasals; midbody scale-rows 19[1]; ventrals 159–170; aquatic ..... *L. r. whytii*
   (Whyte's Water-Snake)
   Nostril directed outwards from a single nasal followed by a postnasal; midbody scale-rows 17; ventrals 171–214; terrestrial ..... *L. c. capense*
   (Cape Wolf-Snake)
8. Ventrals 203–224; subcaudals 47–58; color of vertebral scale-row distinct from that of dorsals and laterals ..... *M. c. capense*
   (Cape File-Snake)
   Ventrals 171–176; subcaudals 55–71; color of vertebral scales similar to that of dorsals and laterals ..... *M. nyassae*
   (Nyasa File-Snake)
9. Midbody scale-rows 25–31; snout rather prominent ..... *P. cana*
   (Mole Snake)
   Midbody scale-rows 11–21 10
10. Pupil round 11
    Pupil horizontal; midbody scale-rows 19; body attenuated with vine-like coloring above and below 35
11. No pair of enlarged grooved fangs situated below the posterior border of the eye 12
    A pair of enlarged grooved fangs situated below the posterior border of the eye, separated by an interspace from the preceding teeth 25
12. Midbody scale-rows 21; ventrals 175–204 ..... *M. semiornata*
    (Semiornate Snake)
    Midbody scale-rows 19 or fewer 13
13. Midbody scale-rows 19; ventrals 128–149 ..... *N. o. olivacea*
    (Olive Marsh-Snake)

[1] If 21, with throat and belly pure white, then it is the Cholo to Zomba race ..... *L. r. mlanjensis*
(Mlanje Water-Snake)

Midbody scale-rows 17 or fewer 14

14. Midbody scale-rows 17; ventrals 125–144 ..... *N. o. uluguruensis*
(Montane Marsh-Snake)

Midbody scale-rows 15; color in life green (darkens in formalin); arboreal 15

15. Usually 2 labials enter the orbit; subcaudals rounded, 77–106 (77–90 in ♀ ♀; 88–106 in ♂ ♂) ..... *P. hoplogaster*
(Southeastern Green-Snake)

Usually 3 labials enter the orbit; subcaudals 90–162 16

16. Subcaudals rounded, 90–121 (90–117 in ♀ ♀; 103–121 in ♂ ♂) ..... *P. i. irregularis*
(Western Green-Snake)

Subcaudals angular, laterally keeled and notched like the ventrals, 126–162 (no sexual differentiation) ..... *P. s. semivariegatus*
(Spotted Bush-Snake)

17. Internasals paired; temporals 2 + 2 or 2 + 3; size moderate; color above, brown with ladder-like markings along the back (*unknown* from Nyasaland, but occurring in Mozambique) ..... *P. lineatus*
(Striped Shovel-snout)

Internasal single; temporals 1 + 1, 1 + 2 or 1 + 3; size small; color above, plumbeous, with or without white flecking ..... *P. a. stuhlmanni*
(Eastern Shovel-snout)

18. Subcaudals in pairs 19

Subcaudals single 37

19. Midbody scale-rows smooth, in 15 rows; pupil round; anterior temporal single; color above, olive or brown, uniform ..... *D. l. shirana*
(Shire Slug-eater)

Midbody scales in 17 or more rows 20

20. Midbody scales smooth, in 19 or 21 rows; pupil round; temporal single; color above, uniformly plumbeous or iridescent black 36

21. Subcaudals of ♂ ♂ more than 77 (78–94), of ♀ ♀ more than 62 (63–87); color above, pinkish brown, usually with numerous, narrow, dark, sometimes light-edged, crossbands, Ω-shaped anteriorly, posteriorly transverse and coalescing on dorsum with a more or less distinct vertebral band; usually found on reddish laterite soil of coastal plain up to 3000 feet ..... *D. s. medici*
(Rufous Egg-eater)

Subcaudals of ♂ ♂ less than 75 (51–74), of ♀ ♀ less than 66 (44–65) .. 22

22. Above, pinkish brown, dark brown, or black, uniform (except near range of *fasciatus* where there may be some transverse dark lines anteriorly); usually found in association with gallery or montane forests ..... *D. s. palmarum*
(Forest Egg-eater)

Above, pale sandy or olive brown, with numerous, dark stripes or

blotches on flanks alternating with a dorsal series of large rhomboidal or squarish spots which may coalesce to form a zigzag vertebral band; usually found in savanna areas and in the vicinity of rivers and marshes ..... *D. s. scaber*
(Rhombic Egg-eater)

23. Ventrals more than 190 (193–242); color above, orange brown to pale yellowish brown, blotched or barred with darker brown or black..... *T. s. semiannulatus*
(Tiger Snake)

Ventrals less than 180 (144–180); color above, plumbeous to blackish, uniform or distinctly flecked with white..... 24

24. Midbody scale-rows 19–21; ventrals 144–180; subcaudals 29–54; preocular 1 (rarely 2); postoculars 2 (rarely 1); occurs *outside* virgin forest areas, chiefly at low altitudes..... *C. h. hotamboeia*
(White-lipped Snake)

Midbody scale-rows usually 17; ventrals 145–175; subcaudals 35–56; preoculars 2 (rarely 1); postoculars 2 (rarely 3); found only in rain forest at high altitudes..... *C. h. tornieri*
(Sylvicoline White-lipped Snake)

25. Midbody scale-rows 19–21..... 34

Midbody scale-rows 11–17 (all have 17 except *P. angolensis*)..... 26

26. Sides of the broad, brown, vertebral band immediately behind head irregular, soon developing into a zigzag line on nape and breaking up into an irregular dorsal series of paired spots; underside heavily mottled and flecked with brown which tends to form lateral lines posteriorly ..... *H. n. nototaenia*
(Eastern Dusky-bellied Snake)

If a dark vertebral band is present immediately behind head, its sides are straight and either more or less parallel or gradually converging..27

27. Rostral shield on snout prominent, beak-like..... 28

Rostral shield on snout rounded quite normally..... 29

28. Color above, pinkish brown, each scale more or less edged with darker; subcaudals over 90 (90–118)..... *R. o. oxyrhynchus*
(Eastern Beaked-Snake)

Color above like a *Psammophylax*, i.e. a fine, light, dark-edged, vertebral line with, on either flank, a broad brown band extending from nostril to tail; subcaudals under 70 (59–63); (*unknown* from Nyasaland but occurring at Mwaya on lakeshore)..... *R. a. acutus*
(Striped Beaked-Snake)

29. Maxillary teeth form a continuous series up to the interspace which separates them from the posterior pair of enlarged fangs..... 30

Maxillary teeth interrupted below the *anterior* border of the eye by two greatly-enlarged fang-like teeth, separated before and behind by an interspace, followed by more small maxillary teeth, then a third inter-

space preceding the enlarged grooved fangs situated beneath the posterior border of the eye.....32

30. Subcaudals, if tail intact, 83–105; usually a single anterior temporal, rarely 2; belly white, markings, if present, take the form of short black *transverse* dashes (this distinguishes it from *P. s. sibilans* which usually has 2, very rarely 1, anterior temporals).....*D. lineatus*
(Lined Snake)

Subcaudals 50–66.....31

31. Temporals 2 + 2, 2 + 3 or 2 + 4; underside pure white; lowland form inhabiting savanna around Zomba, Nchisi, etc.....*P. t. tritaeniatus*
(White-bellied Grass-Snake)

Temporals 1 + 2, 1 + 3 or 1 + 4; underside gray or blackish; montane form inhabiting grassland plateaus of Mlanje, Zomba, Nyika, etc.....
P. t. variabilis
(Gray-bellied Grass-Snake)

32. Midbody scale-rows 11; subcaudals 57–82; a dwarf species.*P. angolensis*
(Angolan Sand-Snake)

Midbody scale-rows 17; subcaudals 78–121; size moderate or large....33

33. Habit robust, at least in adults; underside usually uniform white to plumbeous in adults, though young often exhibit a lateral series of *longitudinal*, discontinuous dashes; habitat usually near water.....
.....*P. sib. sibilans*
(Hissing Sand-Snake)

Habit slender; underside always exhibits a pair of sharply distinct, dark, parallel, longitudinal, lateral lines on white or yellow ground; habitat in dry savanna.....*P. sub. sudanensis*
(Northern Stripe-bellied Sand-Snake)

34. Color of adult ♂, uniform rich green, of adult ♀, brown, of young, variegated; eye rather large; habitat arboreal; attains six feet in length and is usually mistaken for a mamba by Africans.....*D. typus*
(Boomslang)

35. Crown of head profusely speckled with darker; ventrals 149–164[1]; subcaudals 125–148; attains 1250 mm.; habitat principally montane forests or recently deforested areas.....*T. k. capensis*
(Cape Vine-Snake)

Speckling on crown reduced to a few large spots forming a Y-shaped marking whose stem covers the interparietal suture while the arms extend to the supraoculars; ventrals 164–176[1]; subcaudals 140–146; attains 1400 mm.; habitat in lowland savanna adjacent to lake shore and probably along riverine forest.....*T. k. oatesii*
(Central African Vine-Snake)

[1] These figures are based on the small series of snakes secured by the expedition *in Nyasaland* and are subject to expansion; they do not represent the known range of the two forms outside the Protectorate.

36. Midbody scale-rows 21; (in Nyasaland known only from the type or its synonym *miolepis* taken at Cape Maclear) ..... *C. u. polylepis*
(Angolan Purple-glossed Snake)
Midbody scale-rows 19; (*unknown* as yet from Nyasaland but occurs in all surrounding territories; possibly not distinct from *u. polylepis*) .....
C. u. warreni
(Eastern Purple-glossed Snake)
37. First lower labial in contact with its fellow behind the mental .....
A. l. lunulatus
(Blotched-back Centipede-eater)
First lower labial not in contact with its fellow behind the mental 38
38. Young and adults have a black head; nape with a light-edged, 6-scale-wide, black collar; back and tail buff or reddish brown; below white; nostril normally in an entire nasal; size up to 315 mm..... *A. c. capensis*
(Cape Centipede-eater)
Young are black above with *two*, light-edged collars separated by 5 to 7 scales; back and tail uniform plumbeous or steely blue; below, throat white, belly basically so but heavily infuscated with gray; adults uniformly black above and gray or black below; nostril normally in a divided nasal; size up to 400 mm. (occurs with *capensis* but maintains distinctness without intergrading) ..... *A. guentheri*
(Black Centipede-eater)

Key to the Cobras and Mambas (Elapidae) of Nyasaland

1. Head short; snout broader than long; subcaudals less than 90 2
Head long, narrow; snout not broader than long; subcaudals more than 90 5
2. Ventrals less than 175; subcaudals less than 30; midbody scale-rows 13; color above of adults is uniformly black; in young the head is grayish and the body incompletely ringed with alternating broad (dark) and narrow (light) crossbars ..... *E. s. decosteri*
(Mozambique Garter-Snake)
Ventrals more than 175; subcaudals more than 50; midbody scale-rows 13–27 3
3. Eye separated from upper labials by suboculars; 6th or 7th upper labial largest and deepest, in contact with postoculars; anterior temporal single ..... *N. h. haje*
(Egyptian Cobra)
Eye in contact with third or third and fourth upper labials 4
4. Sixth upper labial not largest, not in contact with postoculars; third or third and fourth labials largest and entering orbit ..... *N. n. nigricollis*
(Black-necked Spitting Cobra)
Sixth upper labial largest and deepest, in contact with postoculars; color

above black ..... *N. melanoleuca*
(Black-and-white-lipped Cobra)

5. Midbody scale-rows 17–21, usually 19; ventrals 201–232; subcaudals (97) 109–126; buccal membranes white to bluish white ..... *D. angusticeps*
(Green Mamba)

Midbody scale-rows 21–25, usually 21; ventrals 242–282; subcaudals 105–127; buccal membranes bluish gray to black; color above of young bright green, ranging through olive when halfgrown to dark brown (never black) when adult ..... *D. polylepis*
("Black" Mamba)

Key to the Adders and Vipers (Viperidae) of Nyasaland

1. Top of head covered with large symmetrical shields; pupil round; reproduction oviparous 2

Top of head covered with small scales; pupil vertical; reproduction ovoviviparous 4

2. No loreal; eye minute; ventrals more than 200; subcaudals mostly single; body slender; color uniformly black ..... *A. b. rostrata*
(Zanzibar Burrowing-Adder)

A loreal; eye moderate; ventrals less than 160; subcaudals mostly paired; body moderately robust: color not uniformly black, usually a dorsal pattern of rhomboidal blotches or V-shaped spots ..... 3(*Causus*)

3. Snout more or less rounded; midbody scale-rows 17–21; ventrals 120–156 ..... *C. rhombeatus*
(Common Night-Adder)

Snout prominent, its end more or less turned up; midbody scale-rows 17; ventrals 110–128 ..... *C. defilippi*
(Defilippi's Night-Adder)

4. Subcaudals paired; lateral scales not smaller than the dorsals; body heavy; tail short, straight, not prehensile; habitat terrestrial ..... *B. arietans*
(Puff Adder)

Subcaudals single; lateral scales smaller than the dorsals; body moderate; tail short but with a prehensile curl; habitat: sedges, shrubs and trees; range: Rungwe Mountain, Tanganyika Territory south to Misuku Mountains, Nyasaland ..... *A. n. rungweensis*
(Rungwe Tree-Viper)

PLATES

PLATE 1

Map showing Principal Collecting Localities

1948

Landing at Beira, Mozambique (17–19.vii), Loveridge proceeded by rail to Blantyre, Nyasaland (20–26.vii). Thence by truck to Likabula River (26.vii–6.viii) at foot of Mlanje Mtn., which was ascended to Lichenya Plateau (6–23.viii) with side trip to Chambe Plateau (20.viii). Thereafter Chiradzulu Mtn. (25.viii–1.ix); Zomba Plateau (1–13.ix); Dedza (13–14.ix); Kasungu Boma (14–15.ix); Mzimba Rest House (15–16.ix); Macdonald's Camp, Vipya Plateau (16–20.ix); Katumbi (20–21.ix); Chimunkha (21–22.ix); Matipa Forest, Misuku Mts. (22.ix-18.x); Chinunkha (18-22.x); Chere River Bridge Northern Rhodesia (22–23.x); Nchenachena (23–25.x); Nyika Plateau (27.x.–19.xi); down to Nchenachena (19–23.xi); Mzimba (23–24.xi); Kasungu (24–25.xi); Nchisi Mtn. (25.xi–13.xii); Chitala River at Empire Cotton Growers' Experimental Station (13–21.xii) with side trips to Mpatanjoka near Salima (15.xii) and Mnema, Makanjila on Lake Nyasa (16.xii); Dedza (21–22.xii); Blantyre (22.xii–3.i.49) with side trips to Hynde Dam, Limbe (27.xii).

1949

Ndirandi Mtn. (1.i). On road to Tete, Mozambique (3–4.i), roadside near Micombo east of Tete (4–5.i); Kasumbadedza Village on south bank of Zambezi 5 miles west of Tete — listed and labeled as "near Tete" (5–31.i); roadside near Mpatamanga Gorge Bridge (31.i.); Blantyre (1.ii); Dally's Hotel, Chipoka, Lake Nyasa (2–3.ii); Mtimbuka, as Tembuka on labels (3.ii–7.iii) with side trips to Chowe (12.ii) and Kausi Village, Lake Malombe (25.ii); Blantyre (7–9.iii); Cholo Mtn. (9–28.iii); Magombe Estate, Cholo, (28–29.iii); Ruo & Lujeri Rivers, Mlanje Mtn. (29.iii–11.iv); Blantyre (11–20.iv) with side trips to Limbe (16–17.iv) and Shire River at Chikwawa (18.iv). Left Nyasaland by air (20.iv.49).

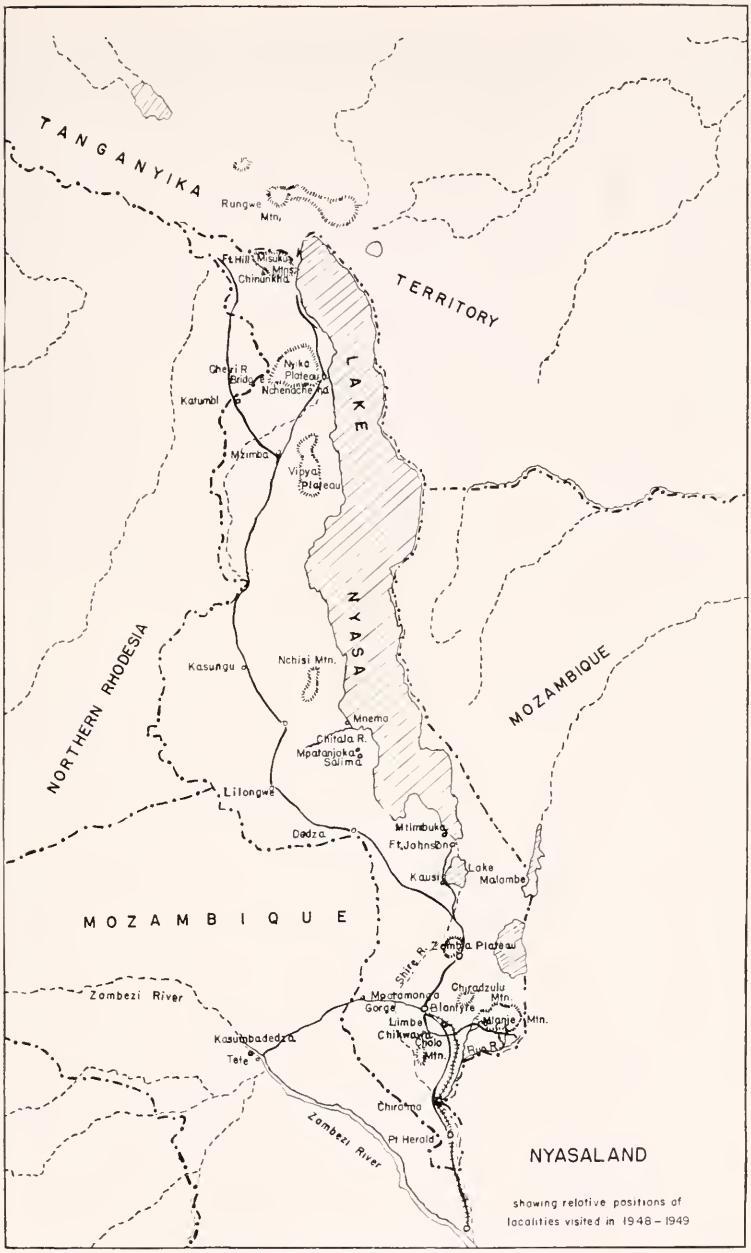

TANGANYIKA
TERRITORY
Rungwe Mtn.
Ft Hill
Misuku Mtns
Chinunkha
Nyika Plateau
Nchenachena Hd
Chewi R Bridge
Katumbi
Mzimba
Vipya Plateau
LAKE NYASA
NORTHERN RHODESIA
Kasungu
Nchisi Mtn.
Mnema
Chitala R.
Mpatanjoka
Salima
MOZAMBIQUE
Lilongwe
Dedza
Mtimbuka
Ft Johnston
Lake Malombe
Kasisi
MOZAMBIQUE
Zomba Plateau
Shire R.
Zambezi River
Mpatamanga Gorge
Chiradzulu Mtn.
Blantyre
Manje Mtn.
Limbe
Chikwawa
Kholo Mtn.
Kasumbadedza
Tete
Chiromo
Zambezi River
Pt Herald
NYASALAND
showing relative positions of localities visited in 1948 – 1949

PLATE 1

PLATE 2

Fig. 1. Giant One-horned Chameleon swallowing a bird.

Mr. J. R. Lennon, to whom I am indebted for this photograph of a Zomba chameleon swallowing a cordon bleu (*Uraeginthus bengalus niassensis*), also sent me a snapshot of another small weaver bird (*Lagnosticta senegala rendalli*) being eaten. A captive One-horned Chameleon in the Coryndon Museum is reported to have eaten fourteen new-born chameleons in the presence of some of the staff.

Fig. 2. Giant One-horned Chameleon (*Chamaeleo melleri*).

This male (now M.C.Z. 50642) captured on Zomba Plateau, may be considered topotypic of the species whose discoverer, a medical missionary named Dr. J. C. Meller, was stationed at Zomba. An even larger male from the Likabula Valley on the slopes of Mlanje Mountain, measures 23½ inches. Females lay from 50 to 70 eggs. Photo by Mary V. Loveridge.

PLATE 2

PLATE 3

Fig. 1. Short-tailed Pygmy-Chameleon (*Brookesia nchisiensis*).

One of three females captured on the outskirts of Matipa Forest in the Misuku Mountains. Later, in glades of Nchisi Forest, others were found depositing their 12 to 15 eggs in the rich loam beneath leaves that had drifted against a fallen tree-trunk. Four of these chameleons were recovered from the stomachs of Cape Vine-Snakes (*Thelotornis kirtlandii capensis*).

Photo by Mary V. Loveridge.

Fig. 2. Plateau Pygmy-Chameleon (*Brookesia platyceps carri*).

This male, one of three chameleons captured by Dr. A. F. Carr in the transition zone of the Ruo Gorge, displays a well-developed, flexible, rostral process. However, a second male taken at the same time, agrees with the female type from the 6000-foot Mlanje Plateau in lacking all trace of such a process. In this and other respects Carr's specimens appear to be in the nature of intermediates between the typical form which occurs at the lower end of the Gorge, and the race inhabiting the mountain plateau.

Photo by Mr. John Crenshaw.

PLATE 3

PLATE 4

Fig. 1. Spotted Bush-Snake (*Philothamnus s. semivariegatus*).

As it was being photographed, this handsomely black-barred, green reptile inflated its throat vertically. Similar intimidating displays have been observed in other arboreal species like the Vine-Snakes (*Thelotornis*) and Boomslang (*Dispholidus*) which achieve this result by forcing air into the trachea whose supporting cartilaginous rings permit expansion only on the ventral portion where they are incomplete. Photo by Miss H. L. Sloan.

Fig. 2. Mpembe, a Yao pseudo-snake-charmer from Blantyre.

Hearing a "snake-charmer" lived just outside Blantyre, I called on him. From the close confinement of a small tin he produced a dreadfully emaciated Spotted Bush-Snake that, after placing on the dusty ground, he proceeded to cram into his mouth which he closed with difficulty. Then, pulling the moribund serpent from his slavering jaws, the disgusting old scamp extended his bleeding tongue — undoubtedly prepared in advance by scratching with a pin or similar article. In a second tin (see photo) he had an equally harmless and exhausted House-Snake (*Boaedon*). This photo was taken on a Friday and Mpembe died the following Sunday, presumably from blood poisoning. As he also practiced witch-doctoring as a sideline and had potential enemies among the neighbors whom he terrorized, a post-mortem was held but death was attributed to natural causes. Photo by Mary V. Loveridge.

PLATE 4

PLATE 5

Fig. 1. Rungwe Sedge-Viper (*Atheris nitschei rungweensis*).

Representing a genus of venomous snakes hitherto unknown from Nyasaland, the capture of four of these tree vipers around Matipa Forest extends the range of *Atheris* still further to the southeast. Since *rungweensis* was described by Bogert in 1940, this race of the common Central African *nitschei* has been known only from a solitary example from Rungwe Mountain in southern Tanganyika Territory. Photo by Miss H. L. Sloan.

Fig. 2. A Defilippi's Night-Adder (*Causus defilippi*).

Found emerging from a hole in the ground near the dessicated Chitala River, just before sunset. It is the crepuscular habits of these toad-eating reptiles that have gained them their group name. Unlike most of the Viperidae, members of the genus *Causus* are oviparous, six eggs were present in the individual photographed on December 15. Photo by Miss H. L. Sloan.

Fig. 3. Tete Gecko (*Pachydactylus tetensis* sp. nov.).

A seven-inch-long species discovered on the banks of the Zambezi where it spends the day in rock crevices inhabited by its equally robust relative *P. bibronii turneri*. The affinities of *tetensis*, however, lie with *tuberculosus* of Equatorial Africa, with which it agrees in possessing preanal pores, a character distinguishing them from all the forty other members of the genus.

Photo by Dr. P. E. Vanzolini.

PLATE 5

Bulletin of the Museum of Comparative Zoology

AT HARVARD COLLEGE

Vol. 110, No. 4

ZOOLOGICAL RESULTS OF A FIFTH EXPEDITION TO EAST AFRICA

IV

AMPHIBIANS FROM NYASALAND AND TETE

By Arthur Loveridge

With Four Plates

CAMBRIDGE, MASS., U.S.A.

PRINTED FOR THE MUSEUM

July, 1953

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IV

Amphibians from Nyasaland and Tete

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INTRODUCTION

The principal collection on which the following report is based, was made by the author while investigating the fauna of the largely deforested mountains of Nyasaland. The enquiry was jointly financed by grants from the Penrose Fund of the American Philosophical Society, and from the Museum of Comparative Zoology on whose behalf it was carried out.

A synopsis of the itinerary is given in the caption accompanying Plate 1 — a map showing the position of the principal collecting localities. Altitudes and other information regarding the various camps will be furnished in the final report of this series which will deal with the general conclusions.

The period of collecting amphibians was from July 29, 1948, to April 18, 1949, during which time 1,680 amphibians, representing 43 species or races, were collected. However, in 1946 (May 27 to October 1) the Vernay-Nyasaland Expedition of the American Museum of Natural History visited the Protectorate in search of mammals, and incidentally gathered 17 amphibians. These Mr. C. M. Bogert of the American Museum submitted to me for identification and incorporation in this report. Of the 10 species collected by the Vernay party only one represented a species I failed to secure in the field. Between us we gathered 43 of the 50 recognizable species or races to be found

in Nyasaland. In listing this material, localities are usually arranged from north to south.

Half a century has elapsed since the last summary of Nyasaland amphibia appeared. Boulenger (1897e, p. 801) then listed 15 kinds of frogs and toads collected by Alexander Whyte; 12 of them allegedly came from the "Nyika Plateau, 6000–7000 ft." This was obviously a case of mistaken labeling for, with one exception, all are low-level species that occur along the lakeshore and were more probably taken by Whyte on the journey down from Kondowe (i.e. Livingstonia, *ca.* 6000 ft.) to Karonga on thelakeshore. Whyte's vague locality "Kondowe to Karonga," is listed as "Karonga to Kondowe," for the species obtained are lakeshore (Karonga) fauna rather than montane (Kondowe = Livingstonia Mission).

Since the turn of the century the only other collection of importance to be made was one by Mr. B. L. Mitchell of the Nyasaland Game and Tsetse Department. Part of it formed the subject of a paper by Dr. A. C. Hoffman (1944b) who listed 17 species. Actually Mitchell has collected nearly double that number, and very kindly placed his unpublished list of records at my disposal so that I might include in this report such as were not open to question.

During the course of the Harvard Expedition 17 additional species or races were added to the fauna of Nyasaland. Of these 7 are here described for the first time as new, viz:

Bufo taitanus nyikae subsp. nov.	Nyika Plateau.
Hyperolius puncticulatus choloensis subsp. nov.	Cholo Mountain.
Hyperolius puncticulatus mitchelli subsp. nov.	Mtimbuka, L. Nyasa.
Phrynobatrachus duckeri sp. nov.	Chitala River.
Phrynobatrachus ukingensis nyikae subsp. nov.	Nyika Plateau.
Arthroleptis xenodactyloides nyikae subsp. nov.	Nchenachena Falls.
Arthroleptis adolfifriederici francei subsp. nov.	Ruo Gorge, Mlanje.

In addition to these new forms, the undermentioned races or species are recorded as entirely

New for Nyasaland

Hyperolius marginatus Peters
Rana galamensis bravana (Peters)
Rana oxyrhynchus gribinguiensis Angel
Rana mascareniensis mossambica Peters
Rana mascareniensis uzungwensis Loveridge

Rana ansorgii Boulenger
Phrynobatrachus perpalmatus Boulenger
Phrynobatrachus ukingensis ukingensis (Loveridge)
Arthroleptis boulengeri de Witte
Arthroleptis reichei Nieden

These additions are largely offset by the necessity of removing from the Nyasaland list a dozen names of species which do not occur, though represented in four instances (indicated with an asterisk) by a race.

Not found in Nyasaland

*Hyperolius concolor** Hallowell, of Liberia
Hyperolius fulvovittatus Cope, of Liberia
Hyperolius fulvoviridis Mitchell, lapsus
Hyperolius cinctiventris Cope, of Natal
Hyperolius horstokii Tschudi, of South Africa
*Rana fasciata** Tschudi, of South Africa
*Rana adspersa** Tschudi, of South Africa
Phrynob trachus acridoides Cope, of Zanzibar
Phrynobatrachus maculatus FitzSimons, of Bechuanaland
*Arthroleptis adolfifriederici** Nieden, of Ruanda
Arthroleptis macrodactylus Boulenger, of Gabon
Arthroleptis variabilis Matschie, of Cameroon
Breviceps verrucosus Rapp, of Natal

In view of my having 44 of the 50 kinds of amphibians known from Nyasaland, and having seen the remaining six at the British Museum, besides having abundant extra-territorial material of most species, it appeared advisable to enlarge the scope of this report so that it might serve as a basis for a herpetology of the country. With this object in view I have included under each species all bibliographical references involving Nyasaland material and, after assessing their probability, all the locality records mentioned. The identification of all Nyasaland amphibia in the British Museum was checked during August, 1952, and any specimens involving previously unpublished localities were added to those listed under *Records*. The published records are followed in parentheses by the initial of the author from whose writings they have been taken. The initials involved are:

B = Boulenger H = Hoffman N = Nieden
G = Günther M = Mitchell P = Peters

Also included are localities taken from a manuscript list of live material

captured by Mr. B. L. Mitchell (M. ms.), to whom I am indebted for this privilege. Only those records were used where the identification seemed beyond doubt. Questionable determinations are omitted as it is unlikely that the actual specimens have been preserved for study purposes.

Other information will be found under such headings as Native Names, Breeding, Diet, Parasites, Enemies, Aestivation, Hibernation, Migration, Habits and Habitat.

ACKNOWLEDGEMENTS

The opportunity is taken of thanking Dr. A. S. Romer, Director of the Museum of Comparative Zoology, for his support of these investigations, and the Trustees of the Penrose Fund of the American Philosophical Society for a substantial grant towards the expenses of the expedition. I am also grateful to the Administration of Nyasaland without whose assistance the execution of my plans would have been well-nigh impossible in a year of almost unprecedented drought and gasoline shortages, and to Mr. B. L. Mitchell of the Fish and Tsetse Department for furnishing me with local information regarding the amphibians in which he is interested.

I am also much indebted to Dr. H. W. Parker and Mr. C. J. Battersby who, during the month I spent in London in 1952, made available to me the Nyasaland material in the British Museum collection. I was thus enabled to see not only the types of ten Nyasaland species, but also to check the conclusions I had arrived at regarding the correct assignment of various specimens identified in very early times by Günther and Boulenger.

To Dr. A. C. Hoffman, Director of the National Museum at Bloemfontein, I am greatly obliged for lending me much of the critical Nyasaland collection reported on by him in 1944. I would also express my thanks to Mr. C. M. Bogert of the American Museum of Natural History for submitting the amphibians collected by the Vernay-Nyasaland Expedition of 1946. Dr. J. T. Lucker has kindly identified the parasitic worms.

Dr. Walter C. Brown of Northwestern University obligingly made a critical examination of our extensive *Hyperolius nasutus* material, and I am also indebted to my colleague, Mr. Benjamin Shreve, for frequently giving me the benefit of his opinion as noted in various places in the text. For the photographs illustrating this report I wish

to thank my wife and her sister, Miss Hilda Sloan, who accompanied me during the first part of the trip.

SUMMARY OF TAXONOMIC ALTERATIONS

Trinomials, which were not employed by Boulenger for indicating geographical races, are required for no less than 31 of the 51 forms dealt with in this report. Among them the following are used for the first time:

Scolecomorphus kirkii Boulenger becomes *S. k. kirkii* Boulenger
Megalixalus brachycnemis Boulenger " *Afrixalus b. brachycnemis* (Blgr.)
Hyperolius albofasciatus Hoffman " *H. marmoratus albofasciatus* Hoffman
Hyperolius tuberilinguis A. Smith " *H. concolor tuberilinguis* A. Smith
Rappia puncticulatus Pfeffer " *H. p. puncticulatus* (Pfeffer)
Rana mossambica Peters (revived) " *R. mascareniensis mossambica* Peters
Rana fülleborni Nieden (revived) " *R. fasciata fülleborni* Nieden
Arthroleptis ukingensis Loveridge " *Phrynobatrachus u. ukingensis* (Loveridge)
Phrynobatrachus mababiensis FitzSimons = *P. u. mababiensis* FitzSimons

Half a dozen species proposed by Hoffman, as well as some earlier names, are considered synonyms, viz:

Chiromantis umbelluzianus Ferreira = *C. xerampelina* Peters
Leptopelis bocagei haasi Mertens = *L. bocagii* (Günther)
Hylambates johnstoni Boulenger = *Leptopelis flavomaculatus* (Günther)
Kassina s. ovamboensis Hoffman = *K. senegalensis* (Duméril & Bibron)
Hyperolius insignis Bocage = *H. marmoratus parallelus* Günther
Hyperolius toulsoni Bocage = *H. marmoratus parallelus* Günther
Hyperolius k. smaragdinus Laurent = *H. concolor tuberilinguis* A. Smith
Hyperolius s. loveridgei Laurent = *H. concolor tuberilinguis* A. Smith
Rappia granulata Boulenger = *Hyperolius nasutus* Günther
Rappia oxyrhynchus Boulenger = *Hyperolius nasutus* Günther
Hyperolius acuticeps Ahl = *Hyperolius nasutus* Günther
Rana nyassae Günther = *R. fuscigula angolensis* Bocage
Rana anchietae Bocage = *R. o. oxyrhynchus* A. Smith
Rana porosissima Steindachner = *R. subpunctata* Bocage
Rana chobiensis FitzSimons = *R. subpunctata* Bocage
Rana Vernayi FitzSimons = *R. mascareniensis mossambica* Peters
Arthroleptis rosei Hoffman = *Rana d. delalandii* (Dum. et Bibr.)
Phrynobatrachus vanrooyeni Hoffman = *P. u. mababiensis* FitzSimons
Phrynobatrachus chitialaensis Hoffman = *P. u. mababiensis* FitzSimons
Breviceps mitchelli Hoffman = *B. mossambicus* Peters
Phrynomerus b. nyasalandensis Hoffman = *P. b. bifasciatus* (A. Smith)

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SYSTEMATIC DISCUSSION
CAECILIIDAE

Scolecomorphus kirkii kirkii Boulenger

Scolecomorphus Kirkii Boulenger, 1883b, Ann. Mag. Nat. Hist. (5), **11**, p. 48: "Probably vicinity of Lake Tanganyika." (*vide infra*). Günther, 1893 (1892), p. 555; Boulenger, 1895a, p. 413, pl. xxiii, figs. 3–3c; K. Peter, 1895, p. 183, figs. 1–6; Johnston, 1897, p. 362; 1898, p. 361a; Nieden, 1912b, p. 192; 1913a, p. 28; Mitchell (as caecilian only), 1946, p. 33.

2 (A.M.N.H. 53239–41) Zomba Plateau. 27.v–11.vi.46.
3 (A.M.N.H. 53242–43) Cholo Mountain. 18.ix–1.x.46.
26 (M.C.Z. 27101–20) Cholo Mountain. 11–30.iii.49.

Records. Shire Highlands (G); Zomba Plateau (M). As I (1933h, p. 350) have taken *kirkii* in the Ubena Highlands of Tanganyika Territory, it should occur in northern Nyasaland where, owing to the absence of rain, I failed to find it.

The type locality of *kirkii* has been long in doubt, a point that assumes some importance as I propose regarding *ulugurnensis* Barbour and Loveridge as a subspecies. Dr. H. W. Parker, to whom I wrote on the matter, has very kindly supplied me with the following information.

No localities whatever appear in the original listing of this Kirk collection in the British Museum register for 1882. Later someone added: "Collected at Mpwampwa." Subsequently this entry had been struck out and in its place was written: "Sent by Sir. J. Kirk, collected probably about Lake Tanganyika." On what grounds this alteration was made is unknown, unless it was based on a letter from Kirk written the week before the collection was registered. This letter states that, on the day of writing, a case of specimens in spirit, which had not been opened since Kirk's departure from Zanzibar, had been left at the addressee's (? A. Günther's) house, No mention is made of amphibians or reptiles, only of beetles and various mammals, some of which were from Zanzibar but one monkey from the "Manyema country West of Lake Tanganyika."

Dr. Parker continues that "Nyasaland" given in Boulenger's 1895 paper in the Proceedings of the Zoological Society, was not intended as an emendation of the type locality but as the range, Nyasaland being the only country from which specimens with precise locality had been received.

Dr. G. Arnold, Director Emeritus of the National Museum of Southern Rhodesia, told me in 1949 that some years ago he came upon the remains of a partly digested caecilian, possibly dropped by a bird, on Mount Gomo, popularly known as Mount Pork Pie, lying to the west of Melsetter, Southern Rhodesia.

If caecilians do occur on the mountains in the vicinity of Melsetter, it implies a 300-mile southward extension of range for the family. At present the most southerly member being *kirkii* on Cholo Mountain. In view of the links between Mount Selinda near Melsetter and the fauna of Mlanje Mountain, on which *Scelotes arnoldi* has now turned up, there is no reason for doubting the possibility.

Native names of Kirk's Caecilian. *Nianta* (pl. *mianta:* Nyanja on Mlanje, where the Natives say it occurs); *nyongolotzi* (Manganja on Cholo; but according to Sir Harry Johnston (1897, p. 365, footnote) *nyongolozi* is an earthworm).

Variation. Body annuli (counted along left side and including the prominent pair on throat together with the indistinct groove following) 131–152, average 143 (extremes checked); 134–150, average 143.7 in seven specimens in the British Museum. A scarcely discernible, darkly pigmented spot beneath the skin of the younger specimens, but absent in adults, indicates the presence of an eye. It seems probable therefore, that the specimen without locality or other data, sent to the Berlin Museum by Boulenger as *kirkii*, but transferred to "*Bdellophis rittatus*" by Nieden (1912b, p. 192) on account of the presence of an eye spot, may well have been *kirkii* whose orbit becomes roofed over with bone only in later life. In life, *S. rittatus* and *kirkii* are readily distinguishable by color and usually by number of annuli.

But, except for color, there now seems little to distinguish *attenuatus* Barbour & Loveridge, 1928, of the Uluguru Mountains at 8000 feet in Tanganyika Territory, from *kirkii*, of which it is best regarded as a northern race.

Color in life. Above, glossy black; sides brownish. Below, white anteriorly becoming — towards midbody — minutely speckled with pink, the specks so concentrated posteriorly as to produce a general pink appearance.

Size. Midbody diameters 7 to 10 mm., included from 32.2 to 46.4 times in the total lengths of from 270 mm. (M.C.Z. 27111) to 400 mm. (M.C.Z. 27101). The type and six (five rather dried) other specimens in the British Museum range from 3.5 to 11 mm., included from 35 to 52.8 times in the total lengths of from 185 (B.M. 92.12.31.45) to 451

(B.M. 93.10.26.94) mm.

Diet. M.C.Z. 27111 is preserved in the act of swallowing an earthworm.

Habitat. Strangely enough none was found in Cholo Forest, even when sodden with rain, though repeated search was made for them during the fortnight we were there. The Cholo specimens in the American Museum were found beneath a pile of vegetation cleared from the camp site just below the forest. On the same spot one came wriggling towards my tent awning during a downpour. It was owing to the heavy rains that fell during our stay on Cholo that I was able to secure this fine series of a species of which less than a dozen are known.

PIPIDAE

Xenopus laevis laevis (Daudin)

Bufo laevis Daudin, 1803, Hist. Nat. Rainettes, p. 85, pl. xxx, fig. 1: No locality.
Xenopus laevis Mitchell, 1946, p. 29.

6 (M.C.Z. 27121–6) Nchisi Mountain. 6.xii.48.
1 (M.C.Z. 27127) Mnema, Makanjila. 16.xii.48.

Records. Highlands of Nyasaland (Mitchell: who writes that he refers to Blantyre; Cholo; Limbe and Zomba. Mitchell is the first to take this species in Nyasaland where, however, it is not restricted to the highlands, for Mnema is on the shore of Lake Nyasa just north of Salima). One would have expected Nyasaland frogs to be referable to *l. petersii* Bocage of Angola (inc. *poweri* Hewitt of S. Rhodesia) but comparison with our abundant Angolan material reveals that this is not the case. Moreover, the prehallux conforms more nearly to that of typical *laevis* than to *l. borealis* Parker of Kenya Colony.

Native name of Smooth Clawed-Frog. *Tesi* (Chewa; Ngoni).

Variation. Vomerine teeth absent; subocular tentacle much shorter than half the orbital diameter; metatarsal tubercle small and blunt; black claws appear flattened when viewed from above.

Color. Underside immaculate in four young, vermiculated with gray or brown in the three ♂♂ of 52–55 mm.

Breeding. The smallest (M.C.Z. 27123) is 56 mm. over all, of which the tail comprises half.

Parasites. A ♂ nematode (*Camallanus* sp. probably *C. kaapstaadi*) was present in the digestive tract of the Mnema frog, the walls of

whose stomach and intestines were plastered with encysted Physalopterid larvae, probably *Spiruroidea*.

? *Hibernation*. On learning from Mr. Mitchell that he had taken *Xenopus* in the Lake Dam on Zomba Plateau between May and November, 1944, I made intensive, but unsuccessful, search for them on various occasions between September 1 and 13. As this was the cold season with nightly temperatures of 45° to 50°, often accompanied by a chill wind, I suspect these aquatic amphibians were hibernating in the mud far out in the lake. So deep was this mud on the periphery of the lake that even when wearing fishermen's thigh-boots one could not wade far from shore, and forcing our nets through the mud there brought up neither frogs nor tadpoles. There is the possibility, though it seems unlikely, that the *Xenopus* may have been swept away by the great flood of December, 1946, which adversely affected the trout population on Zomba.

Migration. When I mentioned the migration of *X. muelleri* (*vide infra*) to Prof. C. A. du Toit, he told me that in a lifetime spent in South Africa he had never seen one, though he had heard of *l. laevis* migrations in the Western Province. Curiously enough he had witnessed a migration of *l. borealis* when on a brief visit to Kenya Colony in January, 1934. He was collecting on the Doinyo Lessos Estate at Eldoret at the time. It occurred on a bright clear day shortly after sunrise while the vegetation was still wet with dew. Through this damp grass the frogs were advancing over a front of about ten yards in width as they proceeded from one shallow pool to another about fifty yards away.

Xenopus muelleri (Peters)

Dactylethra Muelleri Peters, 1844, Ber. Akad. Wiss. Berlin, p. 37: Mozambique. Peters subsequently (1854) revealed that his material came from Boror, Cabaçeira, Sena and Tete; it is advisable to restrict the type locality to Tete, Zambezi River, Mozambique.

Xenopus muelleri Boulenger, 1897e, p. 801; Johnston, 1898, p. 361a; Nieden, 1915, p. 387; Hoffman (as *meulleri*), 1944b, p. 173; Mitchell, 1946, p. 29.

3 (M.C.Z. 27128–30) Chitala River. 18.xii.48.
17 (M.C.Z. 27131–39) Mtimbuka. 7–25.ii.49.
9 (M.C.Z. 27140–8) near Boroma, M. 25.i.49.

Records. Chitala (as Chitiala: H); Fort Hill[1] (B); Karonga to Kondowe (B); Lake Nyasa (N); "Nyika Plateau" (B: an obvious error); Rift Valley of Nyasaland (Mitchell: who writes that he refers to Chitala; Chikwawa; Chiromo; Port Herald).

Native names of Mueller's Clawed-Frog. *Kalololo* (Nyungwe); *namwonde* (Yao).

Variation. Vomerine teeth present or absent in adults; subocular tentacle at least half the orbital diameter (though on one side of M.C.Z. 27135 and 27138–9, it is much shorter, doubtless the result of accidents); metatarsal tubercle prominent, papilla-like, with blunt tip (*not* pointed as so frequently alleged); black claws appear compressed when viewed from above.

Color. Underside vermiculate with gray in young; usually in adults also, though a few are almost immaculate; hind limbs (except in M.C.Z. 27146) rather heavily blotched or spotted with black.

Size. Length of ♂ (M.C.Z. 27130) from snout to anus, 58 mm.; of largest ♀ ♀ (M.C.Z. 27128–9; 27131; 27139), 72 mm.

Breeding. The four large ♀ ♀ mentioned above were full of ova in mid-December and mid-February respectively.

Enemies. While in Mozambique I was especially anxious to obtain representative examples of *muelleri* but, owing to the widespread drought, the only standing water was in Boroma swamp many miles west of Kasumbadedza. To reach it from the road we had to cross several hundred yards of mud, strewn with the large olive shells of water snails that had lately perished by the thousand as the receding water exposed them to the tropical sun. Already the water had shrunk to two great pools surrounded by such deep mud as to render them quite unapproachable. I halted, realizing my intention of netting *Xenopus* was quite impossible, and with it my only hope of securing Mozambique material of *muelleri*.

At the water's edge were a group of miscellaneous wildfowl that included three Hammer-headed Storks (*Scopus umbretta bannermanni*). One of them, disturbed by my approach, took to wing and was passing almost overhead when I shot it. Carried onwards by the momentum of its flight, the bird planed downwards to the hard-caked mud behind us. My gunbearer turned and ran to retrieve the dead stork. On reaching it he called to me to come and see, then pointed to three of the frogs I so much wanted. The slimy amphibians lay in

[1] The 47 mm. specimen is now too macerated to be certain of identification, but I should refer it to *l. laevis* on the basis of the very short tentacle which, of course, may have become truncated; the black claws are all missing.

a line ahead of the stork's bill, having slid from its gullet as it hit the ground. Later, when preserving the skin, we found in gullet and stomach five more *Xenopus*, all so recently swallowed I was able to preserve them as specimens.

Aestivation. At one place where elephant grass was growing at the edge of the original swamp, the mud was already deeply fissured. Far down at the bottom of a crack where they could not be reached, lay two *Xenopus* on their sides. Presumably in similar pockets of damp mud, far below the sun-baked surface, some frogs would survive until the area was reflooded by the returning monsoon rains.

Migration. As a result of several heavy downpours during the first few days of February, a deep pool formed in the bush a hundred yards or so to the rear of the Mtimbuka house. Immediately behind the house, which fronted on Lake Nyasa, was a bare, sandy, well-swept back yard. When the monsoon rains failed to materialize, the pool rapidly shrank under the hot rays of the sun. Happening to go out into the yard late on the afternoon of February 25th I encountered a dozen clawed-frogs all leaping clumsily across the bare ground in the direction of the lake. On reaching the house, which was directly between them and their objective, they jumped against the wall a few times in futile fashion, then turned to left or right until they cleared the obstacle. By following along the wall I was able to pick up fourteen frogs in less than ten minutes, and could easily have got many more.

BUFONIDAE

Bufo carens Smith

Bufo carens A. Smith, 1849, Illus. Zool. S. Africa, **3**, pl. lxviii, fig. 1: Interior of Southern Africa. Hoffman, 1944b, p. 174; Mitchell, 1946, p. 42.

5 ♀ ♀ (M.C.Z. 27149–53) Chitala. 14.xii.48.

Records. Chitala (as Chitiala); Fort Johnston (M.ms.); Mzimba (Brit. Mus.). The first published record of the occurrence of this species in Nyasaland was based on Mitchell's material, a fact overlooked by Hoffman.

Native names of Red Toad. This name, proposed by Mitchell, is descriptive and preferable to Malcolm Smith's suggestion of Slender Toad, which is misleading. Mitchell gives *conga* (Sena at Port Herald); *naliwonde* (Yao); *zonde* (Cewa at Dowa; Manganja at Chikwawa).

Variation. Eye subequal to, or slightly smaller than, the transverse diameter of tympanum; parotid glands absent or indistinct; a post-temporal and dorso-lateral glandular fold separating dorsum from flanks; first and second fingers subequal when adpressed; a tarsal fold; toes slightly webbed.

Size. Snout to anus 89–92 mm.

Breeding. Both largest and smallest full of spawn.

Enemies. Three recovered from stomach of a Verreaux Eagle-Owl (*Bubo lacteus*), one from a White-lipped Snake (*Crotaphopeltis h. hotamboeia*) while a fifth was in process of being swallowed by a *hotamboeia*.

Bufo regularis regularis Reuss

Bufo regularis Reuss, 1834, Mus. Senckenberg, **1**, p. 60: Egypt. Boulenger, 1882b, p. 298; Günther, 1893 (1892), p. 555; 1895, p. 526; Boulenger, 1897e, p. 801; Johnston, 1897, p. 362; 1898, p. 361a.

♀ (A.M.N.H. 53247) Cholo Mtn. 18.ix.–1.x.46.
♂ ♀ (M.C.Z. 27154–5) Misuku Mtns. 7.x.48.
5 juv. (M.C.Z. 27526–9) Nchenachena. 20.xi.48.
♂ (M.C.Z. 27156) Nchisi Mtn. 6.xii.48.
♀ (M.C.Z. 27157) Chitala R. 14.xii.48.
2 juv. (M.C.Z. 27158–9) Mnema. 16.xii.48.
♂ (M.C.Z. 27160) Mtimbuka. 7.ii.49.
♂ (M.C.Z. 27161) Zomba Plateau. 4.ix.48.
3 ♂♂, 4 ♀♀, 1 juv. (M.C.Z. 27162–8) Chiradzulu Mtn. 26.viii.48.
1 juv. (M.C.Z. 27169) Hynde's Dam, Limbe. 27.xii.48.
♀ (M.C.Z. 27170) Cholo Mtn. 11.iii.49.
9 ♂♂, 4 ♀♀ (M.C.Z. 27171–5) Likabula R. 29.vii.48.
♀ & 19 juv. (M.C.Z. 27176–9) near Tete, M. 6–22.i.49.

Records. I also caught, examined and released specimens of *regularis* at Blantyre; Chinunkha; Chowe; and Ruo River. Fort Hill (B); Karonga to Kondowe (B); Nkata Bay to Ruarwe (B); Nyika District and "Plateau"[1] (B); Shire Highlands (G); Zomba and Zomba Plateau. (Brit. Mus.).

Native names of Square-marked Toad. *Bota* (Chewa); *chula* (Misuku; Yao); *chulé* (Nyanja); *chula tengu* (Nyungwe).

Variation. Eye usually much larger than the transverse diameter of

[1] The single small specimen allegedly from the Plateau possesses both tympanum and tarsa fold.

tympanum; parotid glands conspicuous throughout life; neither a post-temporal nor dorso-lateral fold; first finger longer than second when adpressed; a tarsal fold (inconspicuous in very young); toes about half to two-thirds webbed. Least webbed in the 80 mm. ♀ from near Tete.

Size. Snout to anus 11 mm. (M.C.Z. 27176) to 87 mm. (♂, M.C.Z. 27156 and ♀, M.C.Z. 27155).

Breeding. Spawning on July 29 and August 26; calling on September 4 in response to crackling of a bush fire in vicinity of river; calling on September 22, October 18, 22; January 6 and February 7; 11–30 mm. juveniles abundant under damp debris on bank of Zambezi, January 22; 13–15 mm. juveniles on November 20; 17–30 mm. juveniles on August 26, December 16 and 25.

Enemies. Two in stomach of cobra (*Naja n. nigricollis*) at Likabula; one in night adder (*Causus rhombeatus*) at Nchenachena.

Bufo taitanus nyikae subsp. nov.

Type. M.C.Z. No. 27180, a gravid ♀ from my tent on the Nyika Plateau above Nchenachena, at 7500 feet, Nyasaland. Collected by Arthur Loveridge, November 2, 1948.

Paratypes. M.C.Z. Nos. 27181–9 and six uncatalogued ♂♂, being in all nine ♂♂, three ♀♀, and three juveniles from the same general region as the type but collected November 1 to 15, 1948.

Diagnosis. Distinguished from the typical form (with a cotype of which it has been compared) by its larger size — ♀♀ 35–42 mm. (32 mm. is maximum for *t. taitanus* Peters of which we have several of that size from Chifumbazi, Mozambique), as also from *t. uzunguensis* Loveridge (gravid at 28 mm. from the Uzungwe; Ubena; and Poroto Mountains of Tanganyika). Though in size approaching *t. taitanus*, the new race differs in lacking the dark pattern on breast and belly so characteristic of the typical form, while it has a light vertebral line.

While usually agreeing with *t. uzunguensis* (to which it keys down in my synopsis — 1932g, p. 50) in possessing a hairlike vertebral line from snout to anus, the line is absent from snout and crown in four (2 ♂♂, 2 juv.) paratypes, as in the much smaller *t. beiranus* Loveridge (gravid at 22 mm.), the holotype of which I have re-examined and compared with the paratypes of *nyikae*.

Description. Essentially like that of the typical form except in

respect to characters mentioned in the *Diagnosis*. Tympanum absent; parotid glands flat and elongate; neither a post-temporal nor dorso-lateral fold; first finger shorter than second when adpressed; no tarsal fold; toes not, or but barely, webbed at base.

Size. Snout to anus. Juveniles 13, 15 and 17 mm.; ♂♂, 28, 30, 30, 31, 31, 32, 32, 34 and 34 mm.; ♀♀, 35, 36, 39 and the type of 42 mm.

Breeding. In mid-November following showers, several were taken in axillary coitu, a 30 mm. ♂ (M.C.Z. 27182) and 39 mm. ♀ (M.C.Z. 27183) remained so when anaesthetized and are so preserved. They were captured at dawn in one of the boys' tents and two other pairs were also found hopping about out of water for which they were presumably seeking.

Enemies. The foot and belly skin of an adult were recovered from the stomach of a Harsh-furred Mouse (*Lophuromys a. aquilus*), and an entire toad (preserved) from a snake (*Psammophylax t. variabilis*).

RHACOPHORIDAE

Chiromantis xerampelina Peters

Chiromantis xerampelina Peters, 1854, Ber. Akad. Wiss. Berlin, p. 627: Tete and Sena, Mozambique.

Chiromantis umbelluzianus Ferreira, 1921, Jorn. Sci. Lisboa (3), **2**, p. 205, pls. i–ii: Posts of the Umbelluzi Bridge, 50 km. from coast, Lourenço Marques district, Mozambique. Hoffman, 1944b, p. 180; Mitchell, 1946, p. 33.

10 ♀♀ (M.C.Z. 27190–8) Chitala R. 14–17.xii.48.
2 ♀♀ (M.C.Z. 27199–200) Mtimbuka. 4.ii.49.
♂ (A.M.N.H. 53244) Cholo Mtn. 18.ix.–1.x.46.

Records. Chitala (as Chitiala: H). Chikwawa; Chiromo; Fort Johnston (M. ms.); Lake Malombe (Brit. Mus.); Monkey Bay; Port Herald(M. ms.); Ruo District (Brit. Mus.)

Variation. Disk of longest finger slightly smaller than, or equal to, the tympanum; outer finger half to three-quarters webbed; no tarsal fold; tibio-tarsal articulation of the adpressed hind limb attains the tympanum (in 4), posterior corner of orbit (in 7) or the eye (in 1).

Synonymy. C. umbelluzianus was apparently separated by Ferreira on the grounds that the vomerine teeth were allegedly less prominent; the tympanum was half the orbital diameter; and the fingers were one-third, instead of half, webbed. As the amount of webbing varies from finger to finger it is necessary to be more specific. Ahl (1931c, p. 38) referred specimens from Cabaçeira and Tschimbo (now M.C.Z.

17624) to *umbelluzianus* on entirely different grounds, viz. disks rather larger than the tympanum; (instead of allegedly three-quarters in *xerampelina*); and tibio-tarsal articulation of adpressed hind limb attaining to posterior corner of eye or not so far (allegedly from eye to snout in *xerampelina*).

Hoffman (1944b) referred two of Mitchell's Chitala frogs to *umbelluzianus* presumably because their tibio-tarsal articulations reached the posterior corner and middle of eye, respectively, for he states that the tympana were two-thirds the eye diameter. After careful consideration of all these statements I refer *umbelluzianus* to the synonymy as the Umbelluzi Bridge is in the same general region as Mazambo, Limpopo River, from which come frogs (M.C.Z. 7258, 20809) that are definitely *xerampelina*.

Size. Snout to anus of ♂, 58 mm.; of ♀ ♀, 60–87 mm.

Breeding. All the ♀ ♀ held ova. At Mtimbuka a halfgrown ♀ was found on the bookcase of a house that had been closed for some time. I removed it to a bookcase close beside my table where it remained quietly though tools were constantly taken up or laid down within a couple of inches of it. The same evening, February 4, after a shower, *Chiromantis* commenced calling a hundred yards away and my frog left the room and hopped across the back veranda in the direction of the calls. I returned it to the room and shut it in. The following night it was again restless and crossed the room where I found it squatting beside the closed door leading to the veranda. On the 7th a pair of *Chiromantis* were spawning on a branch above a pool and about a hundred yards from the back veranda.

Aestivation. Under favorable conditions this would appear to be only partial. At Chitala, Mr. H. C. Ducker invited my attention to three of these frogs which were squatting on three picture frames in widely separated parts of the lounge, where they had been ever since the cessation of the rains seven months before. Though there was evidence that they moved about at night, feeding on insects attracted by the electric lights, by morning they were always back on the same three frames though there were a great many others scattered around the room. When Mr. Ducker experimentally transferred them to other frames they always returned to their original choice by morning. As, however, the amphibia were not individually marked, this is something of a well-founded assumption. Less certain was their sex, thought to be males as they were of small size, about 60 mm. or under.

Outside on the veranda, squatting upon an ornamental bracket

carrying an electric light (see pl. 4, fig. 1), were three large females, also apparently awaiting the arrival of the monsoon. However, on the night of November 28 when there was an isolated downpour and the veranda was lashed by cold rain driven before a blustering wind, the three frogs deserted their bracket and sought shelter in Mr. Ducker's bedroom. One would have supposed that after a six months' drought accompanied by very high temperatures, the amphibians would have enjoyed a wetting.

Leptopelis bocagii (Günther)

Cystignathus bocagii Günther, 1864c, Proc. Zool. Soc. London, p. 481, pl. xxxiii, fig. 2: Duque de Bragança, Angola.

Leptopelis bocagei Parker, 1936d, p. 97 (includes Nyasaland).

Leptopelis bocagei haasi Mertens, 1937b, Abhand. Senckenberg. Naturf. Ges., No. 435, p. 21, fig. 2: Nsombo, Lake Bangweolo, Northern Rhodesia.

Hylambates bocagii Hoffman, 1944b, p. 180, fig. 7.

♀ (M.C.Z. 27201) Nchisi Mtn. 1.xii.48.
♂ (M.C.Z. 27202) Cholo Mtn. 22.iii.49.

Records. Chitala (as Chitiala: H). Blantyre; Limbe; Zomba (M. ms). Zomba (Brit. Mus.).

Native name of Bocage's frog. *Finye* (Chewa; Ngoni; Nyanja). Mitchell (1946, p. 42) gives this name as that of *Breviceps* in Cewa and Manganja, his informants may have been confused. As this is a burrowing species "Bocage's Tree Frog," proposed by Malcolm Smith (1929, p. 307), is inappropriate as an English name.

Variation. Tip of longest finger included 2 to 2½ times in diameter of tympanum; digital disks virtually lacking; fingers without web; toes with a trace of web at base; tibio-tarsal articulation of adpressed hind limb reaches axilla in ♀, tympanum in ♂.

Synonymy. Parker (1936d) has done much to clarify the status of this frog. However, his friendly suggestion that my inclusion of *anchietae* Bocage (1873) in the long synonymy of *bocagii* was a slip, is not wholly correct. I was led to do so after examination of the material erroneously identified by Noble (1924) as "*anchietae*", a species or race which, at that time, I had not seen.

Hoffman's nomenclature suggests that he was unaware of both Parker's and Mertens' papers. I rather suspect that Mertens' paper went to press before he had seen Parker's, for *haasi* appears to agree perfectly with typical *bocagii*, suggesting that what Mertens regarded

as typical *bocagii* may have been *anchietae*. I submitted a copy of these remarks to Dr. Mertens who replies that in the absence of any topotypical *anchietae* he cannot offer an opinion.

Laurent (1941c, p. 101), whose liking for subgeneric names is not shared by all his colleagues, has made *bocagii* subgenotype for his *Taphriomantis*.

Size. Snout to anus of ♂, 53 mm.; of ♀, 60 mm.

Enemies. One recovered from stomach of a night adder (*C. rhombeatus*) at Cholo.

Habitat. Following heavy rain the Nchisi frog was taken in the vegetable garden by Miss H. L. Sloan.

Leptopelis flavomaculatus (Günther)

Hyperolius flavomaculatus Günther, 1864b, Proc. Zool. Soc. London, p. 310, pl. xxvii, fig. 1: Rovuma Bay, Tanganyika.

Hylambates johnstoni Boulenger, 1897e, Proc. Zool. Soc. London, p. 803, pl. xlvi, fig. 4: Kondowe to Karonga, Nyasaland.

Johnston, 1897, p. 362; 1898, p. 361a; Boulenger, 1898b, p. 475.

Records. The type locality of *johnstoni* is being restricted as above for, in all probability, the fourth cotype of this coastal plain species never came from the "Nyika Plateau, 6000–7000 feet" (B).

Synonymy. Laurent's (1947d, p. 293) remarkable discovery that the type of *flavomaculatus* is a juvenile *Leptopelis* and not an adult ♀ *Hyperolius*, as stated by its author, led me to compare the type of *flavomaculatus* with the type of *johnstoni*, also Günther's colored plate with a series of juvenile *johnstoni* from Magrotto Mountain. I have little doubt that Laurent is correct in suggesting they represent one species, and consequently *johnstoni* must be relegated to the synonymy, though Johnston's Tree-frog might well be retained as the English name, for *flavomaculatus* only describes the very juvenile coloring. I have taken it at Mwaya on the shore of Lake Nyasa, just north of Karonga, but did not succeed in getting any in Nyasaland in 1948, owing to the failure of the rains.

Hylambates maculatus Duméril

Hylambates maculatus A. Duméril, 1853, Ann. Sci. Nat. (3), **19**, p. 165, pl. vii, figs. 1–1b and 4: Zanzibar. Boulenger, 1882b, p. 134; 1891a, p. 308.

4 ♂♂, 1 ♀ (M.C.Z. 27203–7) Shire R. at Chikwawa. 18.iv.49.
2 ♀♀ (M.C.Z. 27208–9) Zambezi R. near Tete. 22.i.49.

Records. Shire Valley (B).

Native name of the Spotted Tree Frog. *Chula* (Nyungwe, *fide* John Simbi, which means that the Nyungwe have no special name for this distinctive black and scarlet frog).

Variation. Disk of longest finger two-thirds to three-quarters the diameter of tympanum; fingers without web; toes nearly half-webbed, only the two distal joints and disk of the longest toe being free; tibiotarsal articulation of the adpressed hind limb reaches the axilla or shoulder. Adult ♂♂ have a well-developed gular disk.

Size. Snout to anus of ♂♂, 60–62 (65 in a Brit. Mus. ♂) mm.; of ♀♀, 54–70 mm.

Habitat. The Shire series were ensconced in banana plants growing on the river bank; the subadults from the Zambezi were hiding beneath damp debris left by the receding river during the prolonged drought.

Kassina senegalensis (Duméril & Bibron)

Cystignathus Senegalensis Duméril & Bibron, 1841, Erpét. Gén., **8**, p. 418: Lakes in the vicinity of Galam, Senegal.

Cassina senegalensis Günther, 1894a (1893), p. 618; Johnston, 1897, p. 362; 1898, p. 361a; Mitchell, 1946, p. 30.

Kassina senegalensis ovamboensis Hoffman, 1942, Soölog. Navors. Nas. Mus. Bloemfontein, **1**, pp. 150, 154: Oshikango, Ovamboland, Southwest Africa.

Records. Zomba (Sir H. H. Johnston); Zomba Mtn. (J. R. Lennon), in British Museum (seen). I failed to get this distinctive species as it remains hidden in termitaria and other subterranean retreats until the onset of the monsoon rains, when it emerges for a relatively short time.

Synonymy. Though to the synonymy of *senegalensis*, Hoffman (1942, p. 152) added *deserticola* Ahl, 1930, of which M.C.Z. 17650 from Windhuk is a cotype, he then described *ovamboensis* as a race of *senegalensis*. Our series of *deserticola* suggests it may represent a large form, while our halfgrown paratype of *ovamboensis* does not have the tips of the fingers and toes swollen as alleged for the race. On page 150 the toes are said to be ¼ to ¾ webbed, whereas our paratype agrees with the figure of the type on page 154 in having no more web than in *senegalensis*. The other differences cited do not inspire confidence in the validity of *ovamboensis*, for some of those on page 150 conflict with those on page 155. *K. senegalensis* is genotype for *Kassina* Girard 1854, to which Laurent and Combaz (1950, p. 273) agree in referring the following as synonyms:

Tornierella Ahl, 1924
Cassiniopsis Monard, 1937
Semnodactylus Hoffman, 1939
Kassinula Laurent, 1940

Size. Snout to anus of the Brit. Mus. specimens: ♂, 33 mm.; ♀, 35 mm.

Afrixalus fornasinii fornasinii (Bianconi)

Euchnemis fornasinii Bianconi, 4.ii.1847 (republished iv.1849 in vol. for 1848), Spec. Zool. Mosamb., Rept., p. 23, pl. v, fig. 1: Mozambique.
Megalixalus fornasinii Boulenger, 1882b, p. 130; 1891a, p. 308; 1897e, p. 801; Johnston, 1898, p. 361a; Hoffman, 1944b, p. 179; Mitchell, 1946, p. 32.

4 ♂♂, 2 ♀♀ (M.C.Z. 27210–4) Mtimbuka. 23.ii.49.
8 ♂♂, 5 ♀♀ (M.C.Z. 27215–9) Kausi Village. 25.ii.49.
♀, 2 juv. (M.C.Z. 27220–2) Cholo Mtn. 16.iii.49.
3 ♀♀ (M.C.Z. 27223–5) Chikwawa. 18.iv.49.

Records. Chiromo (H); Karonga to Kondowe (B); Lake Nyasa (B); Monkey Bay (M. ms); Port Herald (M. ms); Shire Valley (B). I reject "Nyika Plateau, 6000–7000 ft." (B) for this lowland species.

Affinities. The genus *Afrixalus* was proposed by Laurent in 1944 for the African frogs previously referred to *Megalixalus*, now restricted to the single species *seychellensis*. Laurent's conclusions were confirmed by Guibé in 1948. Certainly the big insular *seychellensis* bears little superficial resemblance to the small continental frogs. Trinomials are employed as the West African *dorsalis* (Peters) is regarded as a race.

Variation. Tympanum concealed, though indications of its position may be detected in some ♀♀; fingers well webbed, the outer finger about half; second, third, and fifth toes webbed almost to, or to, the disk; tibio-tarsal articulation of the adpressed hind limb in both sexes, usually (in all 21 Brit. Mus. frogs) attains eye, occasionally falls short, still more rarely surpasses; dorsal skin of 21–24 mm. juveniles smooth, that of all (non-macerated) adults studded with black spines.

Size. Snout to anus of ♂♂, 29 to 34 mm., average 32 mm.; of ♀♀, 33 to 40 mm., average 34 mm. Twenty Brit. Mus. ♀♀ range from 27 to 35 mm. average 35 mm.

Breeding. Surely the froth nests to which Mitchell (1946, p. 32) refers are those of *Chiromantis*, with which he is also (p. 33) acquainted.

Habitat. Without exception all were taken in bananas as described by Mitchell.

Afrixalus brachycnemis brachycnemis (Boulenger)

Megalixalus brachycnemis Boulenger, 1896i, Ann. Mag. Nat. Hist. (6), **17**, p. 403, pl. xvii, fig. 2: Chiradzulu, Nyasaland. Boulenger, 1898b, p. 475; Noble, 1924, pp. 271, 332; Hoffman, 1944b, p. 180; Mitchell, 1946, p. 32.

Rappia fulvovittata Boulenger (not of Cope, 1860), 1897e, p. 801; Johnston, 1898, p. 361a.

Megalixalus fulvovittatus Pitman (not of Cope), 1934, p. 309.

Megalixalus orophilus Laurent, 1947a, Bull. Mus. roy. Hist. Nat. Belgique, **23**, No. 7, p. 1: Lac Magera, 2000 metres, eastern Belgian Congo.

Afrixalus orophilus Laurent, 1950e, Explor. Parc Nat. Albert, Fasc. 64, pp. 21–23, figs. 6–9.

♂ (M.C.Z. 27226) Chitala River. 17.xii.48.
3 ♀ ♀ (M.C.Z. 27227-8, 27250) Ruo River. 31.iii.49.
3 ♂ ♂, 7 ♀ ♀ (M.C.Z. 27229–34) Shire River. 18.iv.49.
♂ (M.C.Z. 27235) Zambezi River. 22.i.49.
♀ & juv. (M.C.Z. 27773–4) Limbe (exch. Mus. Nas. Bloemfontein).

Records. Cape Mclear (♀ in Brit. Mus.); Chiradzulu (B); Chiromo (M. ms.); Chitala (H); Limbe (as "Umbe": H); "Nyika Plateau" (error in loc.: as *fulvovittata:* (B).

Native name of Eastern Short-legged Banana-Frog. *Kachula kachena* (Nyungwe).

Synonymy. The 312 frogs of variable color pattern to which Laurent has given the name of *orophilus* and which, in the absence of morphological characters, he separates from *brachycnemis* on the grounds of habitat, are found in *Hagenia* and bamboo forest from about 3000 to 6000 feet. *A. brachycnemis* occurs chiefly in bananas at 4000 feet on Mlanje and in the Usambaras, down to 50 feet in the vicinity of Tanga. In western Tanganyika I have taken *brachycnemis* at Ujiji, so the supposed gap in distribution between *brachycnemis* and *orophilus* is probably to be attributed to nothing so much as the need for careful collecting by trained herpetologists *at the onset of the rainy season.* So tiny a frog is likely to be overlooked by the ordinary traveller and scorned by the average African.

Affinities. In suggesting that East African *brachycnemis,* as I understand it, is composed of several distinguishable races, Laurent (1947a, p. 3) is certainly mistaken. One can but suppose his material was very scanty for he postulates that typical Nyasaland and Uluguru frogs are distinguished by two parallel dorsal lines; that in Usambara frogs these lines fuse anteriorly; while the alleged coastal form is characterized by irregular and variable markings.

Actually from the Zambezi to north of the Tana, markings, if present, are subject to great variation. So much so that their assignment to any one of the four categories enumerated under the heading of color pattern (*vide infra*) is somewhat arbitrary. A well-defined and striking lateral band may be present on one flank and absent on the other, or continued behind the eye but no further than the shoulder. Similarly the dorsal lines on which Laurent relies, may be developed anteriorly but not posteriorly, vice versa, or coalesced at various points if not altogether lacking as is most commonly the case. But in none of our seven Usambara frogs do the dorsal lines coalesce anteriorly as they presumably do in some individuals seen by Laurent.

Color pattern in East African *b. brachycnemis* from S. to N.

M.C.Z. Nos.	*Localities*	*No lateral or dorsal lines*	*A broad lateral band*	*A lateral band and 2 dorsal lines*	*No lateral band but 2 dorsal lines*
27235	Zambezi R., M.	1			
27229–34	Shire R., N.	3	2	3	
27227–8; –50	Ruo R., N.	2			1
27773–4	Limbe, N.			2	
27226	Chitala R., N.			1	
16837–46	Mwaya, L. Nyasa	216	24	26	11
16847	Mwandemeres, T.	1			
25161–2	Ruvuma R., T.	48	13	11	1
26635	Liwale, T.			1	
25163–4	Mikindani, T.			1	1
9524–5	Dutumi, T.	2			
13336–7	Uluguru Mtns., T.				2
13338–46	Tawa, T.	8			1
9528–9; 16805	Morogoro, T.	6			3
16849–50	Ujiji, T.			1	1
13347–56	Dar es Salaam, T.	4	2	4	
16826–36	Mwera, Z.	20	6	5	2
10196–7	Mkokotoni, Z.		1	1	
13357–60	Usambara Mtns., T.	7		3	4
25169–70	Magrotto Mtn., T.	2	1		2
25165–6	Siga Caves, T.	2			
25167–8	Amboni, Tanga, T.	32	2		
20595	Changamwe, K.C.		1		
20590–4	Golbanti, K.C.	2	6	2	
20585–9	Witu, K.C.	8	2		
20581–4	Peccatoni, K.C.	3	2	6	

Laurent did not propose names for these as Ahl (1931b, pp. 22–122) had done so previously (*ipianae* from Ipiana near Mwaya; *unicolor*

from Ipiana; *multifasciatus* from Rungwe; and *pygmaeus* from Tanga). Ahl placed all four in the genus *Hyperolius* from which I (1933h, p. 399) transferred them to the synonymy of *brachycnemis*. Lest anyone is tempted to revive them subspecifically — because the uniform frogs are strikingly different in appearance from those with sharply defined lateral bands and dorsal lines, though every intergradation occurs — it seems advisable to publish below the data on which my conclusions were based. Trinomials are used because of the existence of a West African race.

Variation. Tympanum concealed; fingers indistinctly webbed at base; second and third toes usually three-quarters webbed, fifth usually (almost in three cotypes) to the disk; tibio-tarsal articulation of the adpressed hind limb reaches to the shoulder or just beyond, but not so far as the eye.

Color. All three cotypes (B.M. 1947.2.9.77–79) have two reddish brown dorsal lines and a lateral band.

Size. Snout to anus of ♂♂, 17 to 21 mm.; of ♀♀ (among which may be included some immature ♂♂), 20 to 27 mm. (M.C.Z. 27250), apparently the record for this species.

Habitat. All taken in bananas on river banks, their scarcity in three localities being due to prolonged drought.

Hyperolius marginatus Peters

Hyperolius marginatus Peters, 1854, Sitzb. Akad. Wiss. Berlin, p. 627: Maçanga, Mozambique.

10 ♂♂, 17 ♀♀, 3 imm. (M.C.Z. 27280–9) Nyika Plateau. 1–19.xi.51.
♂ (A.M.N.H. 53248) Nyika Plateau. viii.46.

Records. New to Nyasaland.

Affinities. These frogs are unquestionably conspecific with the 227 which I (1933h, p. 406) collected in the Uzungwe, Ukinga, Poroto, and Rungwe Mountains just north of the Nyika in Tanganyika Territory. I immediately recognized them as the same in the field, before their diversified coloring had been masked by formalin preservation. As previously (p. 407) stated, we cannot be sure that these frogs are actually *marginatus* until we have topotypes from Maçanga, which I assume to be Makanga on the Aca River west of the Kirk Range and approximately at a point due west of Zomba and due north of Tete. Having secured numerous topotypes of *ngoriensis* Ahl, and *pictus* Ahl (part) I am still confident they are synonyms, and suspect that his *nyassae* is also *in part*, for our paratype *nyassae* (M.C.Z. 17642)

from Rungwe Mtn. is definitely an *undulatus* Boulenger. When it can be demonstrated beyond question that these frogs are really *marginatus* then *picturatus* Peters had best be treated as a race.

The only person to record fresh *marginatus* since 1933 is Mertens (1940a, p. 249) who had a ♂ and two ♀♀ from Ugano, Matengo Highlands, just across the lake from the Nyika Plateau where they occur at 7000 feet.

Variation. Distance from end of snout to nostril about half that between nostril and eye; outer finger with terminal phalanx and disk free of web; fourth toe, at least on one side, with almost two phalanges and disk free of web, the remaining toes with one phalanx and disk only; tibio-tarsal articulation of adpressed hind limb (in both sexes) attains the shoulder or (more rarely) eye; skin smooth above and on throat, the gular disks of ♂♂ being rarely more than subgranular (? preservation); breast and belly granular.

Color. The 16 mm. juvenile's only marking is a faint trace of a canthal-lateral stripe resembling that of *punctiulatus*, present in two of the adults. The latter exhibit the characteristically variable marbling and vermiculations on the flanks so well shown in the five drawings of *pictus* Ahl (1931c, p. 302, fig. 176).

In view of the fugitive nature of the pattern in this species it seems advisable to record some of the diverse types noted in life.

♂. Above, yellowish green; from upper eyelid to insertion of thigh a pair of discontinuous dorso-lateral stripes; from nostril to halfway along flank extends a lateral band except where interrupted by an irregular, dark-edged, yellow streak from below eye to angle of mouth and another that slopes from the tympanic region towards the forelimb; forelimb with several large, dark-edged, yellow spots, a similar spot on flank behind axilla followed by a horizontal yellow streak; along the outer (exposed) part of the hind limb is a brownish band comprised of fine stippling with some irregular, paired, yellow spots, with or without black edging, on thigh and foot. Below, gular disk lemon yellow; rest of throat and belly cream-colored; limbs an almost transparent orange tinged with red towards palms and toes.

Another ♂ has a yellow-green band extending from tip of snout over upper eyelid almost to the groin, in its posterior portion this band is speckled with black; back exhibits some irregular yellow spotting that forms a vertebral streak from region of urostyle to above the anus, otherwise back and flanks uniform with limbs, which are less spotted than in the ♂ described above.

A third ♂ is almost uniformly brown above except for an obsolescent streak just discernible between eyelid and insertion of hind limb; posteriorly this streak is clear yellow on the right side only; the amount of spotting on limbs is even less than in the other two.

♀ adult (M.C.Z. 27286) of 38 mm. Above, reddish brown; from the nostril through eye to above forearm is a dark brown streak, flank brownish with a series of coalescing, dark-edged, vivid yellow spots, two others above anus and half-a-dozen more on thigh and foot. Below, chrome yellow, the limbs colored like those of the first ♂ described above.

♀ imm. of 28 mm. Above, uniform pinkish brown with obsolescent dorso-lateral streak but no trace of yellow spots.

Size. Snout to anus of ♂♂, 24–29 mm., average 28 mm.; of adult ♀♀, 31–38 mm., average 34.3 mm. In addition there are two immature ♀♀ of 28 mm. and a juvenile of 16 mm.

Breeding. During November the adult ♀♀ were obviously ready to spawn. Both they and the males were taken on the senecio-like plants growing in the marshy hollows (*dambo*).

Hyperolius marmoratus albofasciatus Hoffman

Rappia marmorata Günther (not of Rapp), 1895, p. 526: Boulenger 1897e, p. 801; Johnston, 1898, p. 361a.

Hyperolius albofasciatus A. C. Hoffman, 1944b, Soolog. Navors, Nas. Mus. Bloemfontein, p. 178, fig. 8: "Umbe," i.e. Limbe, Nyasaland. Mitchell, 1946, p. 32.

Hyperolius cinctiventris Hoffman (part; not of Cope), 1944b, p. 178: "Umbe" specimens (one is now M.C.Z. 27775).

Hyperolius horstokii Mitchell (not of Rapp), 1946, p. 32.

Hyperolius symetricus Mitchell (not of Mocquard), 1946, p. 32.

♂ ♀ (M.C.Z. 27236–7) Mtimbuka. 9.ii.49.
16 + 7 ♂♂ (M.C.Z. 27244–9, 27300–5) Ruo R. 2.iv.49.
13 + 6 ♂♂, 1 ♀, 5 juv. (M.C.Z. 27238–43, 27290–9) Limbe. 16.iv.49.
♂ (M.C.Z. 27775) Limbe (Exch. Nas. Mus. Bloemfontein).

Records. Fort Johnston (H. H. Johnston & P. Rendall, in Brit. Mus.); Karonga to Kondowe (as *marmoratus:* B); Mandala, Blantyre (as *marmoratus:* G); Monkey Bay (C. Christy, in Brit. Mus.); Mpingwe Hill, Limbe (as *horstokii:* M); Limbe (as *albofasciatus* and *cinctiventris:* H); Zomba (J. S. Old & A. Sharpe, in Brit. Mus.); Zomba Mtn. (as *horstokii* and *symetricus:* M).

Mr. B. L. Mitchell, who collected the material reported on by Hoffman, took me to the precise spot on Mpingwe Hill, Limbe, where he took the holotype of *albofasciatus*. However, owing to the prevailing drought the stream was nearly dry, so he drove me to the nearest pond where we gathered the series of topotypes. Mitchell told me he had also taken the species at Cholo, and considered the dichromatic frogs represented a single species; though at the time I was inclined to disagree with him I have little doubt that he is correct.

Native names of White or White-striped Sedge-frog. *Kilowero* (Nyanja) *zonde* (Chewa), but both are probably generic.

Affinities. There can be little doubt that we are dealing with a species in which one third of the ♂♂ (indicated above by the figures 13 + 6 and 16 + 7) are uniformly colored while the remainder exhibit a striking pattern as figured by Hoffman. This pattern is faint in a few individuals, but none can be considered as representing an intermediate condition between the majority and the immaculate putty-colored minority. In our extensive topotypic series of *m. marmoratus* Rapp are similar immaculate putty-colored specimens which neither my colleague Mr. Benjamin Shreve, nor I, can distinguish from these Nyasaland ♂♂.

In a short series of frogs (M.C.Z. 26313–5) from Kisantu, Belgian Congo, identified as *parallelus* by Laurent, the ♂ is immaculate putty-color while the 32 mm. ♀♀ differ but slightly from *albofasciatus*. In these frogs, as also in at least two of the cotypes of *parallelus* Günther and two (B.M. 97.1.30.12–13) from Zambi, Lower Congo, the dorso-lateral white line is anteriorly separated from the white underside by a more or less well-defined black line. In *albofasciatus* this black line is either entirely absent or at most represented by a series of scattered spots or dashes. However, in this character a frog (B.M. 01.3.12.17) from Kakonga, Lower Congo agrees better with *albofasciatus* and I am not in a position to say whether such a condition occurs commonly among western *parallelus;* if it does, then *albofasciatus* will eventually have to be synonymized with *parallelus* which I regard as a race of *marmoratus*.

Günther (1858b, p. 86) states that his three cotypes of *parallelus* came from "South Africa" and "Angola" respectively, later altered or amplified by Boulenger (1882b, p. 122) as ♀ from "Cape of Good Hope," and ♀ with hgr. from "Ambris, Angola." Unfortunately these last two frogs are badly macerated and Günther figured the "South

African" frog, otherwise one would have been tempted to restrict the type locality to Ambriz, which is 70 miles north of Loanda, which is 260 miles north of Benguela, all three places being on the coast of Angola from which region I have no doubt that the "South African" frog also came.

From Benguela, Bocage, 1868 (1867) described *H. insignis*, apparently based on a ♀ as its throat was smooth and its length 37 mm., and from Loanda, Bocage, 1868 (1867) described *toulsonii*, probably a ♂ for its throat was granular and its length only 26 mm. As I find nothing in the figures of descriptions of these two frogs to suggest they are racially distinguishable from *parallelus*, I consider them to be synonyms of that race of *marmoratus*.

Similarly I regard *melanoleucus* Laurent as another race of *marmoratus*[1] and consider Laurent (1947d, p. 290, footnote) mistaken in saying that *melanoleucus* is indistinguishable from adult *nyassae* Ahl, by which I presume he means what is here called *m. albofasciatus*. Though very similar, I have no difficulty in separating topotypic patterned *albofasciatus* ♂♂ from topotypic patterned *melanoleucus* ♂♂; whether uniform individuals of both races are separable is not so sure.

Laurent (1947d, p. 290, footnote) is wrong in supposing that the type of *nyassae* Ahl was a juvenile, for Ahl gives its length as 31 mm., and sent us a cotype ♂ (M.C.Z. 17642) from Rungwe Mtn. of 29 mm. This bleached ♂ retains the interocular and lateral markings characteristic of the figured type of *undulatus* Boulenger, with which I (1936k, p. 395) synonymized it.

However, Laurent (1943a, p. 108) after examining the types of *undulatus* and *rhodoscelis* Boulenger, both from Pweto, finds that they are really the immature and adult of a single species — *rhodoscelis*. My past references to *undulatus* should, together with its numerous synonyms, therefore be transferred to *rhodoscelis*.

The Nyamkolo frogs that I called "*rhodoscelis*" are referable to *kivuensis* Ahl, as Laurent (1947d, p. 291) discovered and pointed out, but he is incorrect in saying that my topotypic *kivuensis* are *viridiflavus kwidjwiensis* Ahl — except in so far as *kwidjwiensis* is a synonym of *kivuensis* as I (1942f, p. 400) have said. In other words my Idjwi Island *kivuensis* are indistinguishable from the Nyamkolo frogs except that the throats of the latter are lighter, though a few of them exhibit traces of dark speckling.

[1] As does Laurent in a 1951 paper which unfortunately only reached me after this report had gone to press.

Variation. Distance from end of snout to nostril rather more than half that between nostril and eye; outer finger with terminal phalanx and disk free of web (i.e. half-webbed, and *not* "entirely free of webbing" as stated by Hoffman); toes webbed to the disk (at least on one side) except the fourth (and occasionally the first and fifth) which may have part of the terminal phalanx free of web; tibio-tarsal articulation of the adpressed hind limb attains the eye or nostril in ♂♂ (inc. nine in Brit. Mus.), the eye in all three ♀♀ (inc. eight in Brit. Mus.); skin smooth above, also on throat and chest of ♀♀ (except for two at Brit. Mus.), the gular disks of ♂♂ subgranular (? preservation); bellies of all granular.

3 ♂♂, 3 juv. (B.M. 1928.2.20.18–23) Zomba Mtn.

The various names employed by Mitchell for Zomba material result from his having submitted it to various herpetologists with differing views, also from the fact that the juvenile coloring (*symetricus* was based on a juvenile of the *marmoratus* group) bears little or no resemblance to that of the adult. While the British Museum series listed above undoubtedly represents a single form, one ♂ has clearly got more webbing than other members of the series, as I found in my own Nyasaland material. One of the young has a faint dark lateral band, otherwise the coloring is whitish to grayish or a faint brownish putty.

Color of typical *albofasciatus* only. Above, black (in alcohol), rarely gray brown (in formalin); from snout to anus a narrow or moderately broad, usually straight though sometimes wavy (2 ex.) or even interrupted (M.C.Z. 27240), conspicuous white vertebral line; a similarly colored but ill-defined white lateral line from eye to anus, ill-defined because there is often nothing to separate it from the white belly, at most an obsolescent series of dusky spots (representing the black lateral line of the typical form); sometimes also a lateral series of small orange spots extending anteriorly on to upper lip; forelimb white, usually spotted or streaked with black in ♂♂, minutely dusted with brown in ♀♀; thighs colorless (flesh-pink in life); tibia and outer aspect of hind feet white, spotted, streaked, or vermiculated with black, but highly variable and sometimes almost black with white spots. Below, throat uniform white (M.C.Z. 27737) or minutely stippled and dusted with black, ♂♂ display two dark patches, one on either side of the gular disk; rest of undersurface white (thighs, hands and feet flesh-pink to red in life).

Size. Snout to anus of ♂♂, 26–32, average 30 mm.; of ♀♀, 34–35 mm. Both ♂♂ and ♀♀ of topotypic *marmoratus* average slightly smaller.

Breeding. Both ♀♀ were gravid; the Ruo River ♂♂ were captured at night while calling from grass or sedges in a swamp near Lujeri River. The Limbe ♂♂ were taken in daylight as they squatted on sedges standing in water.

Habitat. The Mtimbuka ♂ was found squatting sideways in a hole into which it just fitted; the cavity was in the bark on the vertical trunk of a baobab and situated at a height of about six feet from the ground.

Hyperolius concolor tuberilinguis Smith

Hyperolius tuberilinguis A. Smith, 1849, Illus. Zool. S. Africa, Rept., App., p. 26: country eastward of Cape Colony.

Hyperolius citrinus Günther (part), 1864d, Proc. Zool. Soc. London, p. 311, pl. xxvii, fig. 2: "Zambesi Expedition" (restricted to), and "Senegal" (rejected as typical *concolor*).

Rappia concolor Boulenger (not of Hallowell), 1882b, p. 124; 1891a, p. 308.

Rappia cinctiventris Günther (not of Cope), 1894a (1893), p. 619; Johnston, 1897, p. 362; 1898, p. 361a; Hoffman (part, i.e. Chiromo and Chitala), 1944b, p. 178.

Hyperolius kivuensis smaragdinus Laurent, 1947d, Ann. Mag. Nat. Hist. (11), **14**, p. 292: ♀ holotype from Charre, Mozambique (paratypes consist of 7 ♀♀ and 1 ♂ from Charre; Caia; Quelimane and "Zambesi Expedition.")

Hyperolius sansibaricus loveridgei Laurent, 1947d, Ann. Mag. Nat. Hist. (11), **14**, p. 294: ♀ holotype from Kitaya, Ruvuma River, Tanganyika Territory (paratypes consist of 120 ♂♂ and 13 ♀♀ from Kitaya previously referred to *c. citrinus* Günther by Loveridge).

imm. ♂, juv. (A.M.N.H. 53818–9) Chibotela. 28.viii–18.ix.46.

3 ♂♂ (M.C.Z. 27275–7) Lake Nyasa at Mtimbuka. 23.ii.49.
♀ (M.C.Z. 27278) Shire River at Chikwawa. 18.iv.49.

Records. Chiromo (adult[1] as *cinctiventris:* H); Chitala (as *cinctiventris:* H); Shire Valley (as *concolor:* B). The specimen listed by Günther as from "British Central Africa," having been "transmitted by Mr. H. H. Johnston," appears in the British Museum catalogue as from Zomba (where Johnston resided), but was more probably brought back by Whyte (see p. 618) from Fort Johnston, 14 miles from Mtimbuka, together with the endemic lake fish which certainly never came from Zomba.

[1] But not seen by me, so open to question.

Synonymy. Some years ago I pointed out (1941c, p. 287) that topotypes of *tuberilinguis* A. Smith from Natal, could not be distinguished from Liberian topotypes of *concolor* Hallowell (1844) though 4000 miles apart. In view of the interest now being shown in this difficult genus it appears advisable to emphasize this statement by making *tuberilinguis* a subspecies of *concolor.*

Günther's *citrinus* was a composite for his cotypes came from Senegal (*concolor*) and the "Zambesi Expedition" (restricted to *citrinus*). Günther may have been right when he (1894a) synonymized *citrinus* with *cinctiventris* Cope, though I (1941c, p. 285) do not think so after seeing the alleged type of *cinctiventris* preserved in the Academy of Natural Sciences of Philadelphia.

I have compared the other frogs from the "Zambesi Expedition," Quelimane, and Shire Valley, that Boulenger (1882b) referred to *concolor*, and Laurent more recently (1947d) designated paratypes of his *kivuensis smaragdinus*, and find them specifically indistinguishable from the green ♀ (M.C.Z. 27278) from the Shire River. As it and the straw-colored ♂♂ from Mtimbuka are also indistinguishable from frogs of their respective sexes in our topotypes of *tuberilinguis*, I synonymize *smaragdinus* with that form.

Regarding the "Zambesi Expedition" cotype to which I (1942f, p. 407) proposed restricting the name of *citrinus*, suggesting the specimen might have been taken at Rovuma Bay (near Kitaya) when the Zambesi Expedition stayed there, Laurent (1947d, p. 293) states that the frog "is a juvenile of the *marmoratus* group, but with indistinguishable pattern," yet on page 288, he states that members of the *marmoratus* group are characterized by their juvenile colour-pattern." It is somewhat difficult, therefore, to see the justification for Laurent's alternative suggestion to synonymize *citrinus* with *taeniatus* Peters, 1874, of which the type was a strongly striped, 20 mm. juvenile from Boror on the Zambezi River.

I prefer to regard the extensive Kitaya series as representing *citrinus* Günther, which I am now synonymizing with *tuberilinguis* Smith as neither I nor my colleague Mr. Benjamin Shreve, can detect either color or morphological differences by which they may be separated. In any event as the type series of *s. loveridgei* Laurent, they cannot be distinguished from *tuberilinguis.*

Variation. Distance from end of snout to nostril rather more than half that between nostril and eye; outer finger with terminal phalanx and disk free of web; as also the first and fourth toes though in some

a very narrow seam of web may extend to the disk; the remaining toes are webbed almost to the disks; tibio-tarsal articulation of the adpressed hind limb (in both sexes) attains the eye, or beyond (juv.); skin smooth above as also on throat and chest of ♀; gular disks and chests of ♂♂ granular like all bellies. The foregoing applies also to the holotype and all the paratypes of *Hyperolius kivuensis smaragdinus* at the British Museum, each having been checked individually.

Color. In life the Mtimbuka ♂♂ were straw or putty color, in alcohol whitish to pale brownish with a darker, light-edged above, indistinct canthal streak; in life the ♀ was a vivid green, in alcohol solidly blue-black except on the thighs.

The immature ♂ from Chibotela differs but little. Above, brown, darkening along its lower edge to form an ill-defined darker band from tip of snout to, and along, flank. Definitely not *m. albofasciatus.*

I can only assume that the juvenile is the same species. It displays much of the "*undulatus*" pattern, viz. on its crown a subcircular mark formed of a light semicircular line anterior to, and a second posterior to, and connecting with, the eyelids; a faint, light, cantho-dorsolateral line giving off the characteristic light-edged blotch in front of the groin (as figured by Ahl for *nyassae*); limbs showing the usual dark and light disruptive pattern of young "*undulatus*". See remarks on status of *undulatus* under affinities of *m. albofasciatus.*

Size. Snout to anus of juvenile, 17 mm.; of imm. ♂, 27 mm.; of Mtimbuka ♂♂, 33–36 mm.; of ♀, 39 mm.; i.e. 1 mm. larger than any of the 16 Tanganyika ♀♀ listed in my (1942f, p. 409) series, 3 mm. larger than the type of *tuberilinguis* A. Smith, and 8 mm. larger than the Shire River paratype ♀ (B.M. 47.2.25.40) of *K. smaragdinus* Laurent, but identical in length with the holotype and four other paratypes.

Habitat. The ♂♂, which were emitting an explosive snap-like call similar to that recorded for my Kitaya *citrinus,* were found with the help of a flashlight as they squatted on rain-drenched palm fronds or on the herbage growing among fallen fronds lying in grassland close to the lakeshore. The ♀ was reached by boat, for she was clinging to a sedge growing out of the swirling waters of the Shire River.

Hyperolius argus argus Peters

Hyperolius argus Peters, 1854, Ber. Akad. Wiss. Berlin, p. 628: Boror, Mozambique (based on ♀). Mitchell, 1946, p. 32.

Hyperolius flavoviridis Peters, 1854, Ber. Akad. Wiss. Berlin, p. 628: Boror, Mozambique (based on ♂).

Hyperolius fulvoviridis Mitchell (lapsus for *flavoviridis*), 1946, Nyasaland Agric. Quart. Journ., 6, p. 31: Chiromo, Nyasaland.

♀, juv. (M.C.Z. 27044–5) Chiromo (Zool. Soc. London).

Records. As Boulenger's (1897e, p. 801) record of "*argus*" from the "Nyika Plateau, 6000–7000 ft." was based on misidentified *p. punctic-ulatus* (which see) that probably never came from the Plateau, and Johnston's (1898, p. 361a) listing was based on Boulenger, Mitchell is the first person to record this frog from Nyasaland. Mitchell collected this lowland species just where one might expect to find it — along the Lower Shire. The record was based on living frogs seen in the London Zoological Gardens by Parker. No one, however, knows this frog better, for it was Parker (1931a, p. 902, col. pl. i) who first traced the transitional stages in the development of the color pattern, which differs so strikingly between young and adult, ♂ and ♀. Fortunately, after their decease, two of Mitchell's frogs were preserved by the Zoological Society to whom we are indebted for the specimens listed above.

Synonymy. Though Mitchell tells me he had no intention of designating a new species when he published the name *fulroviridis,* it is apparently validated by his description of it as "a lovely grass green speckled above with tiny dark dots." He further states that some of these frogs can always be found in the tops of the *Ageratum* on the river bank within twenty yards of the rest house at Chiromo.

English name. Argus-eyed Sedge-Frog.

Variation. Distance from end of snout to nostril rather more than half that between nostril and eye; outer finger with terminal phalanx and disk free of web; as also the first and fourth toes, the remaining toes webbed to the disk on one side; tibio-tarsal articulation of the adpressed hind limb attains the forward part of the eye (adult) or just beyond (juv.); skin smooth above and below (as no adult ♂).

Color. Above, pinkish brown, a light, dusky-edged Π-shaped mark on snout from nostril around eye and, after a brief interruption, continued on the right side for rather more than halfway along flank; on the left side three very irregular, light, dark-edged blotches and a fifth on the dorsum.

Juvenile. Pale gray with Λ-shaped mark on snout and two unequal azygous, light, dark-edged spots on dorsum.

Size. Snout to anus of ♀, 30 mm.; of juv., 22 mm.

Hyperolius puncticulatus puncticulatus (Pfeffer)

Rappia puncticulata Pfeffer, 1893 (1892), Jahrb. Hamburg. Wiss. Anst., **10**, p. 31, pl. ii, fig. 2: Zanzibar.
Rappia argus Boulenger (not of Peters), 1897e, p. 801; Johnston, 1898, p. 361a.

♀ (M.C.Z. 3227) "Nyika Plateau." A. Whyte (Exch. Brit. Mus).
♂, 4 ♀♀, 11 juv. (M.C.Z. 27251–63) Misuku Mtns. 23.ix–4.x.48.
juv. (M.C.Z. 27264) Nchenachena. 20.xi.48.
♂ (M.C.Z. 27265) Likabula River. 4.viii.48.
16 ♂♂ (M.C.Z. 27266–9) Ruo River. 1–2.iv.49.

Records. B.M. 97.6.9.198 and M.C.Z. 3227, are undoubted *puncticulatus*. The latter is one of the two frogs from the "Nyika Plateau, 6000–7000 ft." assigned to "*argus*" by Boulenger. I very much doubt if this species occurs as high as stated, though I found it on the slopes of the Nyika at Nchenachena at 4200 ft. but not on the plateau itself where we spent three weeks.

Native name. Koti (Misuku).

Affinities. Accumulating material of *puncticulatus* appears to indicate a northern (*substriatus* Ahl) and southern (typical *puncticulatus*) race meeting on a line drawn from Morogoro to Zanzibar; in Nyasaland are two additional races (described below).

The northern form is well depicted in Ahl's figures of *substriatus*, an exceedingly variable race characterized (typically) by a *broad*, yellow, black-edged canthal band that may be reduced to a nasal spot though more usually is prolonged beyond the eyelid and frequently along the flanks, in which event it tends to become even broader and very liable to disintegrate, sometimes quite fantastically. We have this race (*p. substriatus*) from Malindi, Kenya Colony; the Usambara Mtns. (at Bumbuli; Derema; Phillipshof); Magrotto Mtn. (a cotype and many topotypes); Amboni Estate near Tanga; Kilosa; Morogoro (at foot of Uluguru Mtns.); and Mwera, Zanzibar Id.

The southern form apparently agrees with Pfeffer's not too distinct figure of *puncticulatus* from Zanzibar (Procter's, 1920, fig. of *Rappia puncticulata* really represents *p. substriatus*). Typical *puncticulatus* differs from all other races in its *narrow*, yellow, black-edged, canthal band that passes over the eye and may continue to halfway along the flank, or terminate in tympanic region in which event it is apt to continue as a series of disconnected yellow, black-edged dashes or dots. We have this race (*p. puncticulatus*) from Morogoro (though the specimens may well have come from up the Uluguru); the Uluguru

Mtns. (at Bagilo; Nyingwa; Vituri); Ilolo (at foot of Rungwe Mtn.); and the Nyasaland localities listed above.

Variation. Distance from end of snout to nostril rather more than half that between nostril and eye; outer finger with terminal phalanx and disk free of web; as also the first and fourth toes, the remaining toes webbed to the disk on one side (at least in specimens over 17 mm.); tibio-tarsal articulation of the adpressed hind limb barely attains, attains, or just passes the eye; skin smooth above, also on throat of ♀ ♀• and chest; gular disks of ♂♂ strongly granular as are the bellies, except in young under 16 mm. and in a ♂ (M.C.Z. 27261), though occasionally masked by preservation.

Color. Above, pinkish brown, typically from snout over eyelid to flank a pair of parallel black lines enclosing a narrow yellow (fades on preservation) band that on the flank may, or may not, break up into a series of irregular, yellow, black-edged, blotches (this highly characteristic marking occasionally disappears except immediately in front of, and behind, the eye, where a trace of it may always be detected with a lens); back and limbs usually uniform, sometimes with dusky speckling. While this dusky speckling and Ω-shaped marking on snout appear to be a survival of juvenile pattern, this is not the case with the continuation of the canthal stripe on the flanks, for it is absent in the young.

Size. Snout to anus of ♂♂, 25–35, average 28 mm.; of ♀ ♀, 32–43 mm.; of juveniles and immature frogs from 14 mm. with rudiment of tail (M.C.Z. 27264) up to 29 mm., a very good developmental series.

Breeding. The Ruo River ♂♂ were captured at night while calling from grass and sedges in a swamp near Lujeri River.

Enemies One was recovered from the stomach of a *Crotaphopeltis h. tornieri.*

Habitat. The Misuku series were taken in wild bananas in Matipa Forest with the exception of the largest ♀ which was on the bank of a small stream, where it may have fallen from vegetation during the cutting of a path.

Hyperolius puncticulatus cholоensis subsp. nov.

Text figure 1

Type. M.C.Z. No. 27270, a spent ♀ from Cholo Mountain, at about 3500 ft., Nyasaland. Collected by Arthur Loveridge, March 21–26, 1949.

Paratype. M.C.Z. No. 27271, an adult ♂ taken at same time and place as the holotype. British Museum, No. 47.1.3.78, an adult ♀ from Konjeni, 10 miles below Luchenza, Cholo District. Collected by B. L. Mitchell for the Zoological Society of London.

Diagnosis. A race resembling *H. p. substriatus* Ahl (see remarks concerning affinities under typical *puncticulatus*) in its broad, white (at least in alcohol; I omitted to note its color in life), black bordered, cantho-dorso-lateral stripe which is continued posteriorly two-thirds of the way towards the groin. The ♂ bears a single round, white, black-edged spot on the parietal region, the ♀ two, but lacking the black border, and a series of four more (one behind the other) between region of urostyle and anus; of these the last three are black-edged; limbs buffy brown like the dorsum, immaculate. There are neither parietal nor dorsal spots in the paratype collected by Mitchell.

Description. Substantially as given for typical form, but in the ♂ paratype (possibly due to dessication during life) the webbing is a trifle less extensive than in the holotype; tibio-tarsal articulation of the adpressed hind limb barely attains the eye in both; throat and chest of ♀ ♀ smooth; large gular disk of ♂ granular like bellies and, to some extent, the thighs in both sexes.

Size. Snout to anus of paratype ♂, 32 mm.; of holotype and paratype ♀ ♀, 40 mm.

Hyperolius puncticulatus mitchelli subsp. nov

Text figure 2

Type. M.C.Z., No. 27272, a gravid ♀ from a banana grove almost on shore of Lake Nyasa a few miles north of Mtimbuka, which is 14 miles north of Fort Johnston, Nyasaland. Collected by Arthur Loveridge, February 23, 1949.

Paratypes. M.C.Z., Nos. 27273–4, an adult ♂ and a juvenile taken at same time and place as the holotype.

Diagnosis. A race slightly resembling *H. p. substriatus* Ahl (see remarks concerning affinities under typical *puncticulatus*) in its broad, white (in life also, if I remember rightly), black-bordered, cantho-dorso-lateral stripe which is continued posteriorly two-thirds of the way towards the groin; the very conspicuous black spots on head, back, arms, femur, and outer side of foot in the type, are lacking in the paratypes.

Description. Substantially similar to that given for the typical form

Fig. 1. *Hyperolius puncticulatus choloensis* (Type ♀ M.C.Z. 27270).

though in the type of *mitchelli* the distance from end of snout to nostril is exactly (in paratypes, "rather more than") half that between nostril and eye; outer finger with terminal phalanx and disk free of web; as also the first and fourth toes, in the type the remaining toes are clearly, though not fully, webbed to the disk on one side, but in the paratypes there is half a joint free; in all three frogs the tibiotarsal articulation of the adpressed hind limb barely attains the eye;

Fig. 2. *Hyperolius puncticulatus mitchelli* (Type ♀ M.C.Z. 27272).

throat and chest of ♀ smooth; large gular disk of ♂ granular like bellies and thighs of both sexes.

Size. Snout to anus of paratype ♂, 25 mm.; of holotype ♀, 31 mm.; of juvenile, 21 mm.

Hyperolius nasutus Günther

Hyperolius nasutus Günther, 1864c, Proc. Zool. Soc. London, p. 482, pl. xxxiii, fig. 3: Duque de Bragança, Angola.

Rappia nasuta Günther, 1894a (1893), pp. 619, 620; Bocage, 1896a, p. 104.

Rappia vasata (*sic:* m'sprint) Johnston, 1897, p. 362; 1898, p. 361a.

Rappia granulata Boulenger, 1901g, Ann. Mus. Congo (1), **2**, fasc. 1, p. 4,

pl. ii, fig. 3: Pweto, Lake Mweru, Belgian Congo.

Rappia oxyrhynchus Boulenger, 1901g, Ann. Mus. Congo (1), **2**, fasc. 1, p. 5, pl. ii, fig. 4: Pweto and Lofoi, Belgian Congo.

Hyperolius acuticeps Ahl, 1931c, Das Tierreich, no. 55, p. 282, fig. 153: Ukonde-Unyika, southwestern Tanganyika Territory.

♂ (A.M.N.H. 53299) Chibotela. 28.viii–18.ix.46.
8 juv. (M.C.Z. 27500) Nchisi Mtn. 27.xii.48.

The identification of these last, seven being tailed tadpoles, is open to question.

Records. Nyasa (G., p. 621, by which he undoubtedly meant the Lake as the country was then known as British Central Africa. The frog probably came with the fish from Fort Johnston, though listed in the B.M. register as from Zomba. This was where Whyte and Johnston lived and presumably the place from which the whole shipment was dispatched). Chibotela is about three miles west of the Lake at an altitude *ca.* 1700 ft.

Affinities. Of his "well-preserved example in the Nyasa collection" Günther wrote that "there cannot be any doubt about its identity with" *nasuta* of Angola. Recently Dr. R. Laurent (1943a, p. 74) revived *granulatus* from the synonymy of *nasutus* and recognized *oxyrhynchus* as well. Both of Boulenger's species were described from Pweto and Laurent records both, as well as *nasutus*, from Elisabethville, and *nasutus* with *oxyrhynchus* at Kando; Kasenga; Lukafu; and both from Muita, Luembe, Angola. I am indebted to him for sending me representative series of the two alleged species from several localities. In both "species" the silvery white lateral band may be present or absent. Among the *nasutus* one finds both sharp-nosed ♂♂ and blunt-nosed ♀♀, but I do not find the material corresponds to the morphological differences as set forth by Laurent. For example the webbing on the outer toe extends on the last phalanx halfway between the last tubercle and the disk; in some specimens it may attain the disk, in others only the last joint. The extremes appear distinct of course but the majority are intermediate and I suppose are what Dr. Laurent (p. 68) considers hybrids. I believe he is attempting to separate what is not separable in nature. I find no grounds for supposing that all our material from Angola, the Congo, Northern and Southern Rhodesia, Tanganyika and Kenya represent more than one species which should be called *nasutus*.

As an additional check, however, I submitted about fifty specimens from the half-dozen countries mentioned above, to Dr. W. C. Brown

of Northwestern University for an unbiassed opinion. I withheld the localities while asking him to employ every possible technique in an effort to see whether the material was divisible into one or more races. Finding that tabulation of a large number of various measurements produced no results, Dr. Brown divided the series on certain characters. These appeared to have some relation to alcohol versus formalin preservation but showed no correlation with geographical distribution. Indeed it frequently separated pairs or series taken at the same time in the same place and split the Laurent material of two of the alleged species. This material is available to any discriminating herpetologist who is interested in a further investigation of the problem.

Variation. (Chibotela frog only). Distance from end of snout to nostril about three-quarters that between nostril and eye; outer finger with terminal phalanx and disk free of web; first and fourth toes with one phalanx and disk free of web, the remaining toes with only half a phalanx and disk free of web; tibio-tarsal articulation of adpressed hind limb attains to halfway between eye and nostril; skin rough above; on throat (no disk) and belly granular.

Color. Stained; from snout to anus a series of brown dots, two similar lines (undoubtedly enclosing a light lateral band) extend from nostril over eyelid along the flanks.

Size. Snout to anus of imm. ♂, 16 mm.; of tailless juvenile (M.C.Z. 27500), 13 mm.

RANIDAE

Rana galamensis bravana (Peters)

Limnodytes bravanus Peters, 1882, Sitzb. Ges. naturf. Freunde Berlin, p. 3: "Barawa," i.e. Brava, Italian Somaliland.

♀ (A.M.N.H. 53245) Likabula River. 19.vi.–18.vii.46.

Records. New for Nyasaland, though long known from Mozambique as far south as Beira (Boulenger, 1907j, Proc. Zool. Soc. London, p. 481). The East African race differs from typical *galamensis* of Senegal in the greater extent of its webbing.

Variation. From eye to above groin is a conspicuous, broad, brown, dorso-lateral, glandular fold; tibio-tarsal articulation of adpressed hind limb attains eye; length of tibia less than half the length from snout to anus; fourth toe with two phalanges free of web, fifth toe with one free.

Size. Snout to anus of ♀, 60 mm.

Rana fuscigula angolensis Bocage

Rana angolensis Bocage, 1866b, Jorn. Sci. Lisboa, **1**, p. 73: Duque de Bragança, Angola. Boulenger, 1897e, p. 801; Johnston, 1898, p. 361a.

Rana nyassae Günther, 1893 (1892), Proc. Zool. Soc. London, p. 558: "Shire Highlands, principally upon Mount Zomba and Mount Milanji," Nyasaland. Boulenger, 1894d, p. 641; Bocage, 1896a, p. 104; Johnston, 1897, p. 362; 1898, p. 361a; Noble, 1924, p. 342.

Rana fuscigula Boulenger (not of Duméril & Bibron), 1897e, p. 801; Johnston, 1898, p. 361a.

Spawn, 33 tads., 2 ♂♂, 11 ♀♀ (M.C.Z. 27320–9) Misuku Mtns. 11.x.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 27330–3) Nyika Plat. 13.xi.48.
4 tads., 1 juv., 4 ♂♂, 4 ♀♀ (M.C.Z. 27360–9) Nchenachena. 20.xi.48.
♀ (M.C.Z. 27334) Nchisi Mtn. 1–4.xii.48.
2 ♂♂, 4 ♀♀ (M.C.Z. 27335–9) Chitala R. 17.xii.48.
1 tad., 5 ♂♂, 10 ♀♀ (M.C.Z. 27340–4) Zomba Plat. 3.ix.48.
1 juv., 2 ♂♂, 6 ♀♀ (M.C.Z. 27345–9) Chiradzulu. 26.viii.48.
2 juv. (M.C.Z. 27350) Hynde Dam. 28.xii.48.
2 ♂♂, 1 imm. ♀ (M.C.Z. 27351–3) Cholo Mtn. 11.iii.49.
3 ♂♂ (M.C.Z. 27357–9) Ruo River. 2.iv.49.
7 tads., 1 ♀ (M.C.Z. 27354–6) Likabula R. 4.viii.48.
♀ (A.M.N.H. 53246) Likabula R. vi–vii.46.

Records. Fort Hill (but more probably the adjacent Misuku Mtns., for Boulenger's identification is correct); Nyika Plateau (as *fuscigula:* B); Zomba (as *nyassae:* G). There are other adults from Zomba (J. R. Lennon), and tadpoles from Livingstonia (W. P. Young) in the British Museum.

Variation. Tibio-tarsal articulation of the adpressed hind limb attains nostril (in 3 ex. Nyika and Chiradzulu) or beyond end of snout (63); length of tibia more than half the length from snout to anus; fourth toe with from 1 (usually) to 2 (rarely) phalanges free of web; fifth toe with 1 (15) or half a phalanx (36) free, or webbed to the tip (15). See also remarks under *f. fuscigula.*

Color. A light vertebral stripe is present in all 4 Nyika frogs but in only 2 of the 13 Misuku, 3 of the 15 Zomba, 6 of the 9 from Chiradzulu, and in none of the Nchenachena series. These Nchenachena frogs were a pale yellowish green in life and lack the white suborbital bar so characteristic of *fuscigula* subsp. Instead the region of the upper lip from nostril to tympanum is vermiculated with brown. Their appearance differed from all other *angolensis* so much that in the field I noted they were possibly a new form; however, in the laboratory no

grounds for separation could be found other than their rather smaller size.

Dr. H. W. Parker writes (19.iii.47) me that the type of *nyassae* was long ago transferred to the synonymy of *angolensis* by Boulenger, a disposition with which he and I are in agreement. If our Zomba series is topotypic it seems strange that neither they nor any other of our Nyasaland *angolensis* have the abdomen "largely marbled with dark brown" as described for the type, which I have seen (1952). Other *angolensis* in the collection are occasionally so marbled. One Zomba ♂ (M.C.Z. 27342) might be said to have the throat "nearly entirely dark brown," as in the heavily pigmented type of *nyassae*.

Size. Snout to anus of ♂♂, 44–65 mm., largest ♂ M.C.Z. 27357; of ♀♀, 50–87 mm., largest ♀ M.C.Z. 27334, but surpassed by one (B.M.97.6.9.151) of 95 mm., allegedly from Fort Hill.

Breeding. Tadpoles present in August (Mlanje), September (Zomba), October (Misuku, where frogs were also paired and spawning on the 11th), and November (Nchenachena).

Enemies. Undigested hind limbs present in the stomach of a snake (*Crotaphopeltis h. hotamboeia*).

Habitat. Taken in streams or pools both within and without the evergreen forest on Zomba, Chiradzulu and Mlanje Mountains. In one small brook they liked to rest with only their nostrils out of water at the sides of the larger pools where they were more or less concealed by the fringing vegetation.

Rana fuscigula fuscigula Duméril & Bibron

Rana fuscigula Duméril & Bibron, 1841, Erpét. Gén., **8**, p. 386: South Africa.

1 ♂, 2 ♀♀ (M.C.Z. 27373–5) Misuku Mtns. 6.x.48.
31 tads. & juv., 4 ♂♂, 3 ♀♀ (M.C.Z. 27306–16) Nchisi Mtn. xii.48.
1 ♂, 2 ♀♀ (M.C.Z. 27317–9) Chowe. 12.ii.49.

Records. Boulenger's (1897e) material is referred to *R. f. angolensis*, but one of the Nyika series of seven would key to *R. f. fuscigula*.

Native names of Dusky-throated Frog. *Kasanda* (Misuku); *nachidive* (Nyanja).

Variation. Tibio-tarsal articulation of the adpressed hind limb attains the eye (in 1), the nostril (8), end of snout (2), or just beyond (2); length of tibia about half the length from snout to anus; fourth toe with 1 phalanx (5), 1½ phalanges (5), or 2 phalanges (3 Chowe

frogs) free of web; fifth toe with 1 (3 Chowe frogs) or half a phalanx (4) free, or webbed to the tip (6).

From this it will be seen that in the matter of webbing the Chowe frogs should be referred to *angolensis*, but in tibial length they are certainly *fuscigula*. The variability displayed by both forms (which see) is such as to make one wonder if it is worth while attempting to separate races. The key (Loveridge, 1933b, p. 364) which sufficed to distinguish the three forms north of the equator, certainly requires modification in Nyasaland where the webbing runs the same gamut of variation, though with appreciably different ratios for the short-legged, supposedly lowland, *f. fuscigula*, and the long-legged, usually upland, *f. angolensis*. I assume that, following deforestation, the two forms now interbreed wherever they meet and mingle.

Color. A light vertebral stripe is present in all three Chowe frogs but in only one (♀) of the Misuku, and one (♂) of the Nchisi series apart from a couple of juveniles. Throats exhibit dusky vermiculations (often very faint) except in youngest (34 mm.) ♂; bellies white, only marbled on the flanks.

Size. Snout to anus of ♂♂, 44–68 mm., largest ♂ M.C.Z. 27309; of ♀♀, 55–88 mm., largest ♀ M.C.Z. 27319.

Habitat. The three Misuku frogs were brought to me in a gourd from Mwenichiula's Village far below our camp. In the vicinity of the latter we drained a pond to secure the series of *f. angolensis*. It is assumed that a similar situation occurs on Nchisi Mountain and the single *f. angolensis* may have been taken at some point above the Boma garden where we captured most or all of the *f. fuscigula*. The Chowe frogs were taken in Dr. Lamborn's garden up in the Mangoche Hills *circa* 3200 feet.

Rana johnstoni Günther

Rana johnstoni Günther, 1894a (1893), Proc. Zool. Soc. London, pp. 618, 620: "Tshiromo," i.e. Chiromo, Nyasaland. Boulenger, 1894d, p. 641; Bocage, 1896a, p. 104; Johnston, 1897, p. 362; 1898, p. 361a; Noble, 1924, p. 340.

2 Cotypes (B.M. 93.10.26.76–77; now 47.2.32.31–32) Chiromo.

Variation. Tibio-tarsal articulation of the adpressed hind limb attains the nostril (47.2.31.31) or barely end of snout (47.2.31.32); length of tibia just over half the length from snout to anus ($\frac{25}{49}$ & $\frac{27}{47}$); fourth toe with 1 phalanx (47.2.31.31) or 2 phalanges (47.2.31.32) free of web (except for a narrow seam on the second phalanx); fifth toe

with half a phalanx free or webbed to the tip.

Color. While one (47.2.31.32) of the rather soft cotypes is dark brown and might well pass for a *fuscigula*, the other (47.2.31.31) is variegated all over with white markings on a brown ground; the fore and hind limbs are barred.

Remarks. Still only known from the cotypes in the British Museum, for the five subsequent references are merely listings. Distinguished from *f. fuscigula*, of which it may prove to be a subspecies if not merely just aberrant, by the smaller tympanum, which is about half (rather than "one third") the orbital diameter. The ratio of eye (measured horizontally) to tympanum (measured vertically) is, according to Parker, $\frac{5.9}{2.1}$ on the right, $\frac{5.2}{2.4}$ on the left for the larger frog; $\frac{5.6}{2.4}$ on the right, and $\frac{5.5}{2.6}$ mm. on the left for the smaller. The variation, he says, results from whether the eye is open or closed.

Rana oxyrhynchus gribinguiensis Angel

Rana oxyrhynchus Boulenger (not of Smith), 1897e, p. 801.

Rana (Ptychadena) Gribinguiensis Angel, 1922d, Bull. Mus. Hist. Nat. Paris, **23**, p. 399, fig. : Fort Crampel, Lake Chad, French West Africa.

4 ♂♂, 1 ♀ (M.C.Z. 27380–4) Misuku Mtns. 25.ix.48.
♀ (M.C.Z. 27385) Nchenachena. 20.xi.48.
2 juv., ♂ ♀ (M.C.Z. 27386–7) Nchisi Mtn. 2.xii.48.
♀ (M.C.Z. 27400) Cholo Mtn. 11.iii.49.

Records. This race is new to Nyasaland, but Boulenger's two specimens from the Nyika Plateau, on whose lower slopes is Nchenachena, are certainly referable to this race.

Native names of the Montane Sharp-nosed Frog. *Kasoto* (Misuku).

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches far beyond end of snout; length of tibia much more than half the length from snout to anus (usually equals the distance from anus to occiput or eyes); first, second, third, and fifth toes webbed to the tip or almost so; fourth toe with only 1 phalanx free; black-lined vocal sacs distinguish the males.

Size. Snout to anus of ♂♂, 49–57 mm., largest ♂ M.C.Z. 27383; of ♀♀, 58–61 mm., largest ♀ M.C.Z. 27385; 2 juveniles 17–19 mm.

Parasites. Two pairs (♂ ♀) of nematodes (*Aplectana sp.*) were present in the digestive tract.

Enemies. Two recovered from the stomachs of *Philothamnus, i.*

irregularis, and four from as many Cape Vine-Snakes (*Thelotornis k. capensis*).

Habitat. Close to Matipa Forest along the banks of a stream into which they took prodigious leaps when disturbed by anyone approaching.

Rana oxyrhynchus oxyrhynchus Smith

Rana oxyrhynchus (Sundevall) A. Smith, 1849, Illus. Zool. S. Africa, Rept., pl. lxxvii, figs. 2 and 2a–c: Kaffirland and the region of Port Natal, South Africa. Boulenger, 1897e, p. 801; Johnston, 1898, p. 361a.

3 ♂♂ (M.C.Z. 27390–2) Mtimbuka. 12.ii.49.
2 juv. (M.C.Z. 27388–9) Hynde Dam, Limbe. 28.xii.48.
119 ♂♂, 24 ♀♀ (M.C.Z. 27393–9) near Tete, M. 22–24.i.49.

Records. Karonga to Kondowe (B). Also specimens from Monkey Bay (C. Christy) and Zomba (J. R. Lennon) in British Museum.

Native names of the Savanna Sharp-nosed Frog. *Zonde* (Chewa; Ngoni); *nyaukanzondo* (Nyungwe).

Variation. Tibio-tarsal articulation of the adpressed hind limb attains end of snout or, more usually, well beyond; length of tibia much more than half the length from snout to anus; first, second, third and fifth toes with at most half a phalanx free, fourth toe with 1½ or 2 phalanges free; black-lined vocal sacs distinguish the males.

Color. Occasional individuals in the Tete series lack dorsal markings and consequently look very different from the rest.

Size. Snout to anus of ♂♂, 38–44 mm., largest ♂ M.C.Z. 27393; of ♀♀, 49–58 mm., largest ♀ M.C.Z. 27396; of juveniles 21–24 mm.

Enemies. Recovered from the stomachs of a Hissing Sand-Snake (*Psammophis s. sibilans*) and young Egyptian Cobra (*Naja h. haje*) found hiding in same habitat near Tete.

Habitat. All the "Tete" series were found beneath damp debris left on a sandbar by the receding Zambezi, some at a point opposite Kasumbadedza village, others a few miles nearer Tete. This habitat they shared with *Rana floweri*, the proportions being 74 *oxyrhynchus* to 19 *floweri* on the morning of the 24th, 62 to 4 in the evening.

Rana floweri Boulenger

Rana floweri Boulenger, 1917c, Ann. Mag. Nat. Hist. (8), **20**, p. 417: Rosaires, Blue Nile, Anglo-Egyptian Sudan.

Abrana cotti Parker, 1931a (1930), Proc. Zool. Soc. London, p. 893, fig. 1: Charre, just north of Zambezi Bridge, Mozambique.

8 ♂♂, 15 ♀♀ (M.C.Z. 27373–9) near Tete, M. 22–24.i.49.

Records. Unknown from Nyasaland where it is likely to occur in the Shire Valley.

Native name. Nyankandeli (Nyungwe).

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches the eye (9), beyond (8), or nostril (6) irrespective of sex though ♀♀ average shorter limbs; length of tibia more or less than half the length from snout to anus; first and third toes usually with 1 phalanx free, second and fifth with at most ½ a phalanx free, usually rather barely webbed to tip; fourth toe with 2 phalanges free; black-lined vocal sacs distinguish the males.

Color. No light vertebral stripe, the back being chequered with longitudinally elongate, rectangular, black blotches. Below, white, immaculate in both sexes.

Size. Snout to anus of ♂♂, 43–48 mm., the largest ♂ M.C.Z. 27373; of ♀♀, 43–49 mm., the largest ♀ M.C.Z. 27376; average for entire series 46 mm.

Habitat. Sunken in damp sand under debris deposited on sand bars by the shrinking Zambezi River. Occurring with them were 143 of the related, but much more active, *o. oxyrhynchus.*

Rana mascareniensis mascareniensis Duméril & Bibron

Rana Mascareniensis Duméril & Bibron, 1841, Erpét. Gén., 8, p. 350: Madagascar; Mauritius; Seychelles; Boulenger, 1897e, p. 801; Johnston, 1898, p. 361a.

2 hgr. (M.C.Z. 27401–2) Dedza. 21.xii.48.

Records. Karonga to Kondowe (B); "Nyika Plateau" (B). Boulenger's (1897e) records of *mascareniensis* are identified correctly, but it is highly improbable that the typical form occurs on the Nyika Plateau at 6000 to 7000 feet.

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches far beyond end of snout (just beyond to far beyond in the British Museum material); length of tibia much more than half the length from snout to anus; first, second, third, and fifth toes with 1 phalanx free of web (not so certain in the now macerated Karonga series); fourth toe with 2 phalanges free; black-lined vocal sacs

distinguish the males (in our Malagasy series).

Size. Snout to anus of halfgrown, 31–34 mm.; of ♀ (B.M. ex. "Nyika"), 42 mm.

Habitat. Taken in drainage ditch of cow pasture by swamp just below the Angoni Highlands Hotel.

Rana mascareniensis mossambica Peters

Rana Mossambica Peters, 1854, Ber. Akad. Wiss. Berlin, p. 626: "Tette" . i.e. Tete (now restricted), Boror; Cabaceira; and Quilimane, Mozambique.
Rana mascareniensis Günther (not of Duméril & Bibron), 1895, p. 526.
Rana Vernayi FitzSimons, October 1932, Ann. Transvaal Mus., **15**, p. 39; 1935b, **16**, p. 383, figs. 3 & 4: Metsimaklaba River, Bechuanaland Protectorate.

♀ (M.C.Z. 27404) Nchisi Mtn. –.xii.48.
♂ (M.C.Z. 27405) Mtimbuka. 12.ii.49.
♀ (M.C.Z. 27406) Chowe, Mangoche. 12.ii.49.
6 ♂♂, 5 ♀♀ (M.C.Z. 27407–10) near Tete, M. 22–24.i.49.

Records. Marimba 13°10′ S., 33°20′ E. (J.E.S. Old) in Brit. Mus.; Shire Highlands (G), presumably around Blantyre or Zomba.

Native name of Mozambique Mascarene-Frog. *Zonde* (Chewa; Ngoni).

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches eye or nostril; length of tibia half[1] (Mozambique) to more than half (Nyasaland) the length from snout to anus; first toe with 2 phalanges free of web, second and third with 1½, fourth with 3, and fifth with 1 phalanx free; black-lined vocal sacs distinguish the males.

Synonymy. One of the specimens of *vernayi* (V.L.K.E. 965, now M.C.Z. 17714) taken with the type, has been compared with topotypes of *mossambica* and I find them inseparable. In view of the immaturity of FitzSimons' entire series the vomerine teeth do not differ significantly from those of *m. mascareniensis.* The outer metatarsal tubercle stressed by FitzSimons is present and conspicuous in all the Mozambique and Nyasaland frogs listed above. Indeed this is the only character that distinguishes it from *m. uzungwensis* in which the outer metatarsal tubercle is lacking, though sometimes represented by a light spot. Doubtless *vernayi* came to be described owing to Boulenger's (1882a, p. 52) action in synonymizing *mossambica* with *mascareniensis,* though subsequently he regarded it (in ms. *fide* Parker) as a "variety".

[1] But half to more than half in Brit. Mus. Nyasaland material.

Color. A broad, light vertebral stripe is present in all, and serves to distinguish them in the field from *floweri* and *oxyrhynchus* with which they associate.

Size. [1]Snout to anus of ♂♂, 35–44 mm.; of ♀♀, 41–48 mm., examples of 48 mm. were taken in all three localities where ♀♀ were found.

Habitat. The Mtimbuka frog was taken with *oxyrhynchus* in a water hole, from which they could not escape, two miles north of Fort Johnston. At Chowe beneath garden trash. Near Tete with *oxyrhynchus* (which see), a species that outnumbered them 13 to 1.

Rana mascareniensis uzungwensis Loveridge

Rana mascareniensis uzungwensis Loveridge, 1932, Bull. Mus. Comp. Zool., **72**, p. 384: Dabaga, Uzungwe Mountains, Tanganyika Territory.

♂ ♀ (M.C.Z. 27403) Lichenya Plateau. 13 & 19.viii.48.

Records. This race, which has never before been recorded from Nyasaland, should be looked for on the high mountains to the north.

Remarks. R. m. uzungwensis was erroneously synonymized by Schmidt (1936, p. 129) with *subpunctata* Bocage, 1866, a very different frog with extensive webbing like *oxyrhynchus.* While the frogs from Chitau and Gauca, Angola, that Schmidt had, and some of which I have seen, are unquestionably *m. uzungwensis, Rana anchietae* Bocage, 1866 (1867), with whose description Schmidt compared them, is in reality a synonym of *oxyrhynchus* and should be removed from the synonymy of *subpunctata,* where it was placed by Schmidt. On the other hand *R. porosissima* Steindachner, 1867, is a synonym of *subpunctata,* as is also *chobiensis* FitzSimons, 1932.

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches far beyond end of snout (nostril to end of snout in the three paratypes from Benguela to Bihe, Angola, in the British Museum); length of tibia much more than half the length from snout to anus; webbing exactly as recorded for *m. mossambica,* from which it differs in the absence of a well-defined outer metatarsal tubercle, and, locally perhaps, in the longer hind limb.

Color. Unlike the type series, these two frogs from Mlanje Mountain are exceptionally dark, the ♂ lacking a vertebral stripe which in the female is reduced to a hairlike line.

[1] Applies also to Brit. Mus. material.

Size. Snout to anus of ♂, 32 mm.; of ♀, 38 mm.

Habitat. The ♀ was dug up in the garden, where it was presumably hibernating, fifty yards from a rivulet in whose vicinity the ♂ was taken.

Rana ansorgii Boulenger

Rana ansorgii Boulenger, 1905c, Ann. Mag. Nat. Hist. (7), **16**, p. 107, pl. iv, fig. 1: Between Benguela and Bihe, Angola.

3 juv. (M.C.Z. 27411–3) Chiradzulu Mtn. 26.viii.48
4 ♀♀ (M.C.Z. 27414–7) Likabula River. 4.viii.48.
♂, 6 ♀♀ (M.C.Z. 27418–24) Lichenya Plateau. 13.viii.48.

Records. New to Nyasaland but occurs in southeastern Tanganyika.

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches end of snout or well beyond; length of tibia much more than half the length from snout to anus; first, second, third and fifth toes with 2 phalanges free of web, fourth toe with 3 phalanges free; black-lined vocal sacs distinguish the males.

Color. Usually there is a characteristic solid dusky line following the contour of the lower jaw around from shoulder to shoulder.

Size. Snout to anus of ♂, 36 mm.; of ♀♀, 35–43 mm.; of juveniles 24–27 mm.

Habitat. The Chiradzulu juveniles were taken in the stream behind the Boma; the Likabula frogs from a swamp beside the Forestry Depot; the Lichenya series in the streamlet meandering through a forest copse behind Araloon Cottage. There they were constantly calling "tink-tink," a note having a distinct resemblance to the squeaky noise made by a loose-jointed table. The same call was heard from streams on the moorland as far distant as halfway to Chambe Plateau, but the banks were so undercut we never saw a frog. Presumably they were of the same species as those that hid in, or under, the thick tussocks of grass at the stream's edge and, when disturbed, plunged in and without pause buried themselves in the mud at the bottom.

Rana fasciata fülleborni Nieden

Rana fasciata Günther, (not of Tschudi) 1893 (1892), p. 555; Johnston, 1897, p. 362; 1898, p. 361a.

Rana fülleborni Nieden, 1910, Sitzb. Ges. naturf. Freunde Berlin, p. 436: Ngosi Volcano Crater Lake, Poroto Mountains, Tanganyika Territory.

Rana fasciata merumontana Loveridge (not of Lönnberg), 1933h, p. 372.

3 ♀ ♀ (A.M.N.H. 53249–51) Nyika Plateau. *ca.* 11.viii.46.
21 juv., 45 ad. (M.C.Z. 27430–9) Nyika Plateau. 28.x.–18.xi.48.
5 ♂ ♂, 1 ♀ (M.C.Z. 27425–9) Likabula River. 4.vii.48.

Records. Shire Highlands (G); Zomba Plateau (Mitchell ms).

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches end of snout (in young and then but rarely) or far beyond; length of tibia much more than half the length from snout to anus; first and second toe with 2 phalanges free of web, third and fifth toes with 3, and fourth with 4 phalanges free; males *without* black-lined vocal sacs at base of lower jaws.

Remarks. When, with some misgivings, I (1933h, p. 372) synonymized *fülleborni* with the northern *merumontana*, I pointed out the intermediate character of the southern Tanganyika frogs of which we had ample material from the Poroto, Ukinga, and Uzungwe Mountains. A study of the new material from northern and southern Nyasaland makes me reverse the former view and revive *fülleborni* as a race on the basis of pattern and size.

I am indebted to my colleague, Mr. Benjamin Shreve, for painstakingly examining and recording the data for about 125 *fasciata* subsp. in the collection of the Museum of Comparative Zoology. This revealed that the extent of the webbing on the toes was the same in all races, viz. from the first to the fifth their free phalanges were 2, 2, 3, 4, 3. It was observed that the left leg is frequently slightly shorter than the right, which results in an element of error for the left was chiefly, though not invariably, utilized for ascertaining the point to which the tibio-tarsal articulation of the adpressed hind limb attained. The results were as follow :

Race	*reached snout*	*just beyond*	*well or far beyond*	*Number examined*
f. merumontana (N. Tanganyika)	21	7	0	28
f. fülleborni (S. Tanganyika)	1	8	19	28
f. fülleborni (N. & S. Nyasaland)	1	7	20	28
f. fasciata + *f. montana* (S. Africa)	5	8	22	35

From this it would appear that Nyasaland frogs are nearer to *fasciata* than to *f. merumontana*. We have paratype material of *f. montana* FitzSimons, 1946, which differs principally from typical *fasciata* in color and pattern.

Color. The black lateral lines of *f. fasciata* are broken up into dashes or spots in the great majority of *f. fülleborni*, a race that is noticeably larger than the others.

Size. Snout to anus of ♂♂, 34–37 mm., largest ♂♂ M.C.Z. 27426–7; of ♀♀, 38–52 mm., largest ♀ M.C.Z. 27435.

Enemies. One frog (M.C.Z. 27426) exhibits slight (5 mm.) regeneration of right leg below knee where it had doubtless been seized in its youth by some predator.

Rana adspersa edulis (Peters)

Pyxicephalus edulis Peters, 1854, Ber. Akad. Wiss. Berlin, p. 626: Boror; Mozambique; and Tete (now restricted), Mozambique.
Pyxicephalus adspersa var. Günther, 1895, pp. 526–7.
Rana adspersa Mitchell (not of Tschudi), 1946, pp. 30, 42.
Rana adspersa edulis Loveridge, 1950b, p. 253 (habits and history and localities to date).

2 ♂♂, 2 ♀♀ (M.C.Z. 27440–3) near Tete, M. 17–27.i.49.

Records. "Shire Highlands" (G: based on a 63 mm. bullfrog); Port Herald (M); Rift Valley (M). Chiromo (M. ms.); Chitala River (M. ms.).

Native name of the Edible Bullfrog. *Sesi* (Nyungwe).

Variation. Tibio-tarsal articulation of the adpressed hind limb reaches the axilla; length of tibia about one-third the length from snout to anus; first and second toes with 1 phalanx projecting free from fleshy base, third and fifth with 2 phalanges free, fourth toe with 3 phalanges free; males indistinguishable except by their lemon-yellow throats and flanks which possibly is not peculiar to males.

Size. Snout to anus of ♂♂, 83–117 mm.; of ♀♀, 85–85 mm.

Breeding. Both ♀♀ were gravid.

Enemies. One was recovered from the stomach of a monitor lizard (*Varanus n. niloticus*), another was harassed during the night by driver ants which probably drove it above ground in my tent.

Habitat. On January 17, despite absence of rain and daily temperatures of 100° between noon and 4 P.M., at 5.30 P.M., i.e. an hour before sundown, I heard one of these fossorial frogs moving among

dead leaves drifted beneath a pile of thorn branches. The amphibian retired into a rat hole from which we dug it.

Rana delalandii delalandii (Duméril & Bibron)

Pyxicephalus Delalandii Duméril & Bibron, 1841, Erpét. Gén., 8, p. 445, pl. lxxxvii, figs. 1–1b: South Africa.

Arthroleptis rosei Hoffman, 1944b, Soölog. Navors. Nas. Mus. Bloemfontein, No. 14, p. 174, figs. 1–4: "Chitiala" i.e. Chitala River, Nyasaland. Rose, 1950, p. 112.

Records. Though *delalandii*, which occurs in all surrounding countries, has as yet never been recorded from Nyasaland, Mr. B. L. Mitchell, who collected the type of *rosei*, informs me that he also took *delalandii* at Chitala River. This is precisely the type of habitat favored by this fossorial frog of the subgenus *Pyxicephalus*, though some herpetologists not unreasonably prefer to give the group full generic status.

Synonymy. After comparing Hoffman's somewhat rough sketches of the rather striking dorsal pattern of *Arthroleptis rosei* with young *delalandii* of comparable size, I came to the conclusion that Hoffman's 27 mm. type was *not* an adult ♀ *Arthroleptis* as he states, but an immature *delalandii* with typical spade-like inner metatarsal tubercle, but no outer tubercle. This conclusion is confirmed by an examination of the 18 mm. paratype (A 2673) which has vomerine teeth. Allegedly a ♀, it has never been dissected and may well be too young to sex with certainty.

Phrynobatrachus perpalmatus Boulenger

Phrynobatrachus perpalmatus Boulenger, 1898b, Proc. Zool. Soc. London, p. 479, pl. xxxviii, fig. 1: Lake Mweru, Northern Rhodesia.

♀ (M.C.Z. 27550) Chitala R. 13.xii.48.
3 ♂♂, 11 ♀♀ (M.C.Z. 27540–9) Mtimbuka. 7.ii.49.
37 (M.C.Z. 27530–9) near Tete, M. 22–24.i.49.

Records. *P. perpalmatus* has not previously been recorded from Nyasaland though occurring in the surrounding countries. In 1940 Mertens identified material as *perpalmatus* from Mbamba Bay on the east shore of Lake Nyasa. My fresh material has been compared with cotypes of *acridoides* (Cope) and of *perpalmatus*, leaving me none too sure of the identification.

Native name. *Mondo* (Nyungwe).

Variation. Tympanum more or less distinct; tips of fingers more or less spatulate, those of the toes with tiny disks, to which the webbing extends on all toes except the fourth, as the disk occupies the greater part of the terminal phalanx it may be said that the phalanges free of web from first to fifth are 1, 1, 1, 1–1½, 1; tibio-tarsal articulation of the adpressed hind limb reaches eye (mostly ♀♀), between eye and nostril (both sexes), or nostril (some ♂♂). The right foot of M.C.Z. 27539 is forked, having healed or regenerated in this way.

Color. The characteristic dark bar from eye to commissure of mouth is indistinct or absent in these formalin-preserved specimens; a light, hair-like vertebral band is present in six Mtimbuka but only two Tete frogs; however, several exhibit a pale brown, narrow or broad, ribbon-like mid-dorsal band; the oblique light lines on the buttocks are present or absent. Below, some subadults are almost entirely white, ranging to ♀♀ with most of the underside finely peppered with darker, and ♂♂ whose heavily infuscated dark throats show only scattered white spots posteriorly.

Size. Snout to anus of Mtimbuka ♂♂, 24–25 mm., of some Tete ♂♂, 23–25 mm.; of gravid Chitala and Mtimbuka ♀♀, 27–30 mm., of some Tete ♀♀, 27–29 mm. All Nyasaland, but only a dozen of the Mozambique frogs, were measured.

Breeding. In all localities on the dates specified, which normally cover the monsoon rains, most of the larger ♀♀ were distended with ova.

Enemies. One was recovered from the stomach of a sand-snake (*Psammophis s. sibilans*) near Tete; another from a vine-snake (*Thelotornis k. oatesii*) at Mtimbuka.

Habitat. The Chitala frog was taken in a puddle formed by a shower. I caught the Mtimbuka frogs in waterlogged grass behind Lamborn's house and close to the lake shore. The "near Tete" series were found in damp spots along the sandbars of the shrinking Zambezi both west and east of Kasumbadedza village.

Phrynobatrachus duckeri sp. nov.

Phrynobatrachus maculatus Hoffman (not of FitzSimons), 1944b, p. 176.

Type. M.C.Z., No. 27581, a gravid ♀ from a freshly formed pool in sandy soil in a corner of one of the Cotton Growers Experimental Station dams at Chitala River, Nyasaland. Collected by Arthur

Loveridge, December 13, 1948.

Paratypes. M.C.Z., Nos. 27580, 27582–3, being three ♂♂ (one now in British Museum) taken with the type. Also designated as paratypes are the nine specimens (Nas. Mus. Bloemfontein, No. 2595) of which one is now M.C.Z. 27777. Additional material, but not to be regarded as paratypes on account of their immaturity, are:

6 subadults (M.C.Z. 27584–9) Limbe 16.iv.49.

Diagnosis. Indistinguishable, except in size, from *P. natalensis*, a large series of which were obtained at 5000 feet on nearby Nchisi Mountain. The possibility of identifying these frogs with *ranoides* Boulenger — currently regarded as a synonym of *natalensis* — was considered and rejected after direct comparison had been made with the holotype ♂ of *ranoides* by Dr. W. H. Parker and myself. Dr. Parker kindly furnished me with the ratio of the horizontal diameter of tympanum to that of the eye of the pertinent material:

in the 22 mm. ♂ type of *ranoides* the ratio is 2.0 times.
in the 22 mm. ♂ paratype *duckeri* the ratio is 1.6 times.
in one 24 mm. ♂ paratype *duckeri* the ratio is 2.0 times.
in one 24 mm. ♂ paratype *duckeri* the ratio is 2.7 times.
in a 29 mm. ♂ of *natalensis* the ratio is 1.7 times.

Description. Tympanum more or less distinct; tips of fingers and toes not dilated; from first to fifth toes the phalanges free of web are 1, 1, 2, 3, 2; tibio-tarsal articulation of the adpressed hind limb reaches eye (♂, ♀, and subadults) or just beyond (♂♂ and subadults). See also Hoffman's detailed description.

Color. Above, substantially as described by Hoffman; but a light vertebral line is present in two of the Limbe frogs. Throats of the three breeding ♂♂ black, in sharp contrast to the almost pure white undersurfaces of the entire series which exhibit, at most, a faintly discernible pair of dusky marks on the chest.

Size. Snout to anus of breeding ♂♂, 22–24 mm., of gravid holotype ♀, 26.5 mm.; of non-breeding Limbe series 21–24 mm.

Breeding. The gravid ♀ is not exactly "slender" being 15 mm. broad.

Habitat. The Limbe frogs were captured at a pond many miles from Hynde Dam. I was conducted to the dam in which the Chitala series were obtained by Mr. H. C. Ducker, after whom I take pleasure in naming this new species, as being the most likely place from which Mr. B. L. Mitchell secured the nine specimens submitted to Hoffman.

Phrynobatrachus natalensis (Smith)

Sternorhynchus natalensis A. Smith, 1849, Illus. Zool. S. Africa, Rept., App., p. 24: Natal, Union of South Africa.

Phrynobatrachus acridoides Boulenger (not of Cope), 1879e, p. 801; Johnston, 1898, p. 361a.

1 ♂, 3 ♀♀ (M.C.Z. 27551–4) Misuku Mtns. 25.ix.48.
54 (M.C.Z. 27560–9) Nchisi Mtn. 27.xi.48.
2 ♀♀ (M.C.Z. 27555–6) Chiradzulu Mtn. 31.viii.48.
2 ♂♂, 2 ♀♀ (M.C.Z. 27557–9) Hynde Dam, Limbe. 28.xii.48.
44 (M.C.Z. 27570–9) Likabula R. 2.viii.48.

Records. Previously unrecorded from Nyasaland, but the specimens from the Misuku Mtns. and "Nyika Plateau" (which almost certainly came from lower down the mountain) listed as *acridoides* by Boulenger, were subsequently redetermined by him as *natalensis* and *ranoides*, though never published. I have seen them and consider all referable to *natalensis*. There are also others from Zomba (J. R. Lennon) in the British Museum.

Native name. Mbovu (Chewa and Ngoni).

Variation. Tympanum more or less distinct; tips of fingers and toes *not* dilated; from first to fifth toes the phalanges free of web are ½–1, ½–1, 1½–2; 2½–3; 1½–2 respectively; tibio-tarsal articulation of the adpressed hind limb reaches eye (55, both sexes), between eye and nostril (26, both sexes), or nostril (27, nearly all from the Likabula series in which immature frogs predominate).

Color. A light vertebral line is present in 10 of the 54 Nchisi frogs, in only 4 of the 44 from Likabula River, Mlanje Mountain.

Size. Snout to anus of largest ♂ (M.C.Z. 27560) and ♀ (M.C.Z. 27565), both 35 mm.; of 38 ♂♂, 26–35 mm.; of 14, mostly gravid, ♀♀, 28–35 mm.; of 57 unsexed, 21–34 mm.

Breeding. On August 2 (Likabula) not breeding; on 31st (Chiradzulu) ova small; on September 25 (Misuku) ova developing; on November 27 (Nchisi) assembled and breeding in pool; on December 28 (Limbe) one of the two ♀♀ was gravid.

Enemies. One recovered from stomach of a cobra (*Naja n. nigricollis*) at Likabula.

Phrynobatrachus ukingensis ukingensis (Loveridge)

Arthroleptis ukingensis Loveridge, March, 1932a, Bull. Mus. Comp. Zool., **72**, p. 385: Madehani, Ukinga Mountains, Tanganyika Territory.

27 ♂♂, 25 ♀♀, 11 juv. (M.C.Z. 27590–9) Misuku Mtns. 23–30.ix.48.

Records. New to Nyasaland. For occurrence of the lowland race *u. mababiensis* also in the Misuku Mountains, see *u. mababiensis*.

Remarks. On purely osteological grounds, Laurent (1941b, pp. 203 and 206) has clarified the recurring confusion between *Arthroleptis* and *Phrynobatrachus* by transferring those intermediate forms of "*Arthroleptis*" (*Parathroleptis* of E. Ahl) possessing a tarsal as well as two metatarsal tubercles, to *Phrynobatrachus* where he groups them as a subgenus (*Parathroleptis*). I have followed this arrangement. It interests me for it removes from *Arthroleptis* those forms with normal pond-spawning habits, while leaving in *Arthroleptis* the species — so far as their breeding habits are known — which deposit their eggs in burrows excavated by the maternal metatarsal tubercle.

When describing *ukingensis* I compared it with *minutus*, but this abundant Nyasaland material containing numerous black-throated ♂♂ reveals this forest frog to be even nearer to *mababiensis*, from which it can be separated only by the digital disks. This character, usually associated in ranids with rain-forest species, was apparently lost when *ukingensis* took to upland marshes or alpine meadows. The types of *u. ukingensis* were taken in swampy ground just outside the forest, while *u. mababiensis* (as "*parvulus*") occurred on the undulating grasslands.

Variation. Tympanum hidden; tips of the fingers more or less spatulate, most of the toes with tiny disks; toes with only a trace of web at base, the phalanges free of web from first to fifth being 2, 2, 3, 4, 3; tibio-tarsal articulation of the adpressed hind limb falls short of (14) or reaches (49) the eye.

Size. Snout to anus of 27 ♂♂, 15–17 mm.; of 25 ♀♀, 16–22 mm.; of 11 juv., 9–13 mm. Every individual measured and tabulated.

Breeding. On October 11, many tadpoles, presumably of this frog, were collected and preserved.

Enemies. One recovered from the stomach of a *Crotaphopeltis h. tornieri*, remains of two others in a viper (*Atheris n. rungwensis*).

Habitat. Mostly from a boggy rivulet that meandered through a clearing in the evergreen forest, others in marshy ground abutting on the forest.

Phrynobatrachus ukingensis nyikae subsp. nov.

Type. M.C.Z. No. 27609, a gravid ♀ from marshy ground on the

Nyika Plateau above Nchenachena, at 7000 feet, Nyasaland. Collected by Arthur Loveridge, about November 1, 1948.

Paratypes. M.C.Z. Nos. 27600–8, together with uncatalogued duplicates, having same data as the type but collected October 29 to November 6, 1948. Also A.M.N.H., Nos. 55337–8, being two juveniles collected by Dr. L. J. Brass, August 11, 1946.

Diagnosis. Distinguished from the lowland *u. mababiensis* by the tibio-tarsal articulation of the adpressed hind limb failing to reach the eye in 98 of the 103 specimens, also by the much darker coloring which is black above and very heavily infuscated below except in the youngest frogs.

Description. Characters substantially those of *u. mababiensis,* but the tibio-tarsal articulation of the adpressed hind limb reaches only to the shoulder (and to the eye in only 5 per cent of the material of which every specimen was tested and measured).

Color of Type ♀. Above, blackish, from snout to anus a light, hair-like, vertebral line (absent in almost all the paratypes). Below, lips, breast and belly heavily marbled with blackish brown; throat and thighs stippled with brown so as to almost obscure the white ground color; underside of forelimbs white.

Size. Snout to anus of 65 ♂♂, 14–17 mm.; of 24 ♀♀, 16–20 mm., only the type ♀ (M.C.Z. 27609) measured 20 mm.; of 13 juv. 10–15 mm.

Breeding. The black-throated ♂♂ were calling from end of October to at least mid-November but, as will be seen from the foregoing figures, relatively few females had arrived.

Habitat. The boggy bottoms of the numerous valleys and ravines on the undulating plateau.

Phrynobatrachus ukingensis mababiensis FitzSimons

Phrynobatrachus mababiensis FitzSimons, March, 1932, Ann. Transvaal Mus., **15**, p. 40, and 1935b, *ibid.*, **16**, p. 390, fig. 26: Tsotsoroga Pan, Mababe Flats, Bechuanaland Protectorate (Type ♂, 15 mm.).

Phrynobatrachus vanrooyeni Hoffman, 1940a, Soölog. Navors. Nas. Mus. Bloemfontein, **1**, p. 99, fig. 2B: Broedershoek, Greytown, Natal (Type ♀, 16 mm., paratype ♂, 16 mm.).

Phrynobatrachus chitialaensis Hoffman, 1944b, Soölog. Navors. Nas. Mus. Bloemfontein, **1**, p. 177, figs. 5–6: "Chitiala," *i.e.* Chitala River, Nyasaland (Type ♂, 13 mm.). Mitchell (as *chitalensis*), 1946, p. 30.

Arthroleptis sp. Hoffman, 1944b, p. 176 (juv. 10 mm.).

8 ♂♂,	17 ♀♀,	28 juv.	(M.C.Z. 27610–9) Nchenachena. 22.xi.48.
15 ♂♂,	9 ♀♀,	28 juv.	(M.C.Z. 27620–9) Nchisi Mtn. 27.xi.48.
2 ♂♂,	3 ♀♀		(M.C.Z. 27630–4) Chitala R. 16.xii.48.
	2 ♀♀,	2 juv.	(M.C.Z. 27635–6) Dedza. 21.xii.48.
3 ♂♂			(M.C.Z. 27637–9) Mtimbuka. 7.ii.49.
12 ♂♂,	20 ♀♀,	37 juv.	(M.C.Z. 27640–9) Hynde Dam. 28.xii.48.
23 ♂♂,	8 ♀♀,	25 juv.	(M.C.Z. 27650–9) Likabula R. 2.viii.48.
6 ♂♂,	15 ♀♀,	20 juv.	(M.C.Z. 27660–9) near Tete, M. 24.i.49.

Records. Chitala (H) and Salima (M), both as *chitialensis*. Otherwise new to Nyasaland though there are three 10–11 mm. juveniles, allegedly from the Misuku Mountains, in the British Museum which Boulenger referred to *Arthroleptis minutus*, probably with misgivings for he omitted them from the 1897 report on Whyte's collection. As their digits display no disks they presumably came from dry uplands.

Synonymy. Having compared paratypes of *mababiensis* (M.C.Z. 17716–20) and *vanrooyeni* (M.C.Z. 24509–10) with topotypes of *chitialaensis* (M.C.Z. 27630–4), and the juvenile frog referred to *Arthroleptis* by Hoffman, I am satisfied that the numerous frogs from the mountains of southern Tanganyika Territory that I (1933h, p. 386) assigned to "*parvulus*" are in reality *u. mababiensis*. At the time I thought it improbable that montane frogs should be identical with a relatively low altitude species like *mababiensis*, but the form occurs from 4000 feet in Nyasaland down to 250 feet at Tete in Mozambique.

Since 1936 I have received frogs from localities in central Angola identified by Dr. H. W. Parker and K. P. Schmidt as *parvulus* Boulenger, 1905. Though these frogs are within the lengths ascribed to *mababiensis* below, they are at the upper limits of the range and consequently suggest that *parvulus*, whose solitary type was only 13 mm., is a western relative of *mababiensis* or a synonym of *minutus*.

In the 1933h citation I related how *minutus*, whose breeding ♂♂ have a chrome colored throat and a different call to the black-throated *mababiensis* (which I miscalled "*parvulus*"), was breeding in different parts of the same pool in the Uzungwe Mountains, but are otherwise indistinguishable except for size. It is possible that *minutus* ♀♀ are included in the Limbe series whose measurements are given below. Neither my colleague Benjamin Shreve, nor I, could find justifiable grounds for separating them.

Variation. Tympanum hidden; tips of fingers and toes not dilated; toes with only a trace of web at base, the phalanges free of web from

first to fifth toe being 2, 2, 3, 4, 3; tibio-tarsal articulation of the adpressed hind limb falls short of (occasionally) or reaches (usually) the eye (but only a few from each locality examined).

Color. Of the Limbe series 15 ♂♂, ranging from 14–17 mm., had black throats; 18 ♂♂, ranging from 16–19 mm. (so possibly referable to *minutus*), had dusky or whitish throats, as did also the 14–17 mm. Chitala ♂♂ whose throats were baggy, but white.

Size. Snout to anus of 69 ♂♂, 14–18 mm.; of 74 ♀♀, 16–22 mm.; of 140 juv., 11–15 mm. Both the 21 mm. and 22 mm. ♀♀ came from Limbe. Mitchell's (1946, p. 30) statement that "breeding females measured 13 mm." seems questionable.

Breeding. In August males were emitting their clicking call in a marsh at Likabula River. From end of November to end of January there were at least some gravid ♀♀ in every series taken, except at Dedza.

Habitat. At edge of a dessicating waterhole in Chitala River bed; in roadside ditches at foot of hill below Dedza hotel; the Mtimbuka frogs were taken at night in a waterlogged savanna; the Limbe series were congregated on mud or among grass at edge of the shrinking reservoirs; Likabula specimens were in a marsh near river and the Forestry Depot; while those from Mozambique were hiding beneath damp debris left on sandbars by the receding Zambezi River.

Arthroleptis xenodactyloides nyikae subsp. nov.

Type. M.C.Z. No. 27480, a gravid ♀ from the foot of the first Nchenachena Falls on the Nyika Plateau, about 7000 feet, Nyasaland. Collected by Arthur Loveridge, November 3, 1948.

Paratypes. M.C.Z. Nos. 27481–9, besides fifteen uncatalogued, taken at the same time and place as the type. Also M.C.Z. Nos. 27490–2, from beside stream in patch of forest nearest our camp at about 7000 feet.

Diagnosis. Distinguished from *x. xenodactyloides* Hewitt, 1933, of Selinda Mountain, Southern Rhodesia (38 topotypes of which are in the M.C.Z.), and *x. nkukae* Loveridge, 1942, from the Rungwe, Ukinga, and Uzungwe Mountains of southern Tanganyika Territory (350 paratypes of which are in the M.C.Z.), in its more deeply notched tongue (in which it approaches *xenodactylus* Boulenger), in having the throat and belly black marbled with white at all sizes from 8 to 23 mm. (in *x. xenodactyloides* the belly is white and the throat largely so

except in ♂♂ where it is dusky; in *x. nkukae* both throat and belly are white in the young but substantially like *x. nyikae* when adult) and by its larger size (gravid ♀ ♀ being 23–24 mm. instead of 18–19 mm.).

Description. Type ♀. Head not wider than body (also in paratypes); tympanum indistinct, two-thirds the orbital diameter; first finger shorter than second which extends as far as fifth when pressed together, fourth (on its outer side) twice as long as the fifth (this also applies to the apparently longer fourth finger of a ♂ paratype); tips of fingers and toes swollen or slightly dilated, their bases without webbing; tibio-tarsal articulation of the adpressed hind limb reaches the tympanum (the eye in 9 adult paratypes, just beyond the eye in 4 others); an inner, but no outer, metatarsal tubercle.

It is in substantial agreement with Hewitt's full and excellent description of *xenodactyloides*, apart from differences noted in the diagnosis above.

Color of ♀ type in life. Above, gray, a pale interocular patch edged with black behind; on scapular region are similar but smaller flecks; two others, also irregular in outline, on either side of lumbar region; a dark-edged circum-anal area extends forwards to about the end of the urostyle region; upper arm very pale, forearm dark; hind limb and all digits pale with darker mottling. Below, throat, forelimbs and belly black with silvery white flecks and spots (usually) most pronounced on chest and belly; hind limbs dark red (in adults only) with some silvery white and black flecking.

In the paratypes the color is very variable above, ranging from pale fawn and leaden gray to very dark with lighter and still darker patches, with or without the characteristic hour-glass pattern of the genus on the dorsum.

Size. Snout to anus of paratype ♂, 20 mm.; of type ♀, 23 mm.; while the range of the entire series is as follows: 8 mm. (2), 9 (4), 10 (2), 11 (5), 12 (1), 17 (3), 18 (2), 19 (4), 20 (2), 21 (1), 22 (1), 23 (1).

Breeding. In early November some of the larger frogs were gravid.

Habitat. The entire series from the base of the Falls was taken among, mostly beneath, a jumble of small boulders, interspersed with fallen leaves, beside the river where, so far as one could judge, the ground would always be damp.

Arthroleptis boulengeri de Witte

Arthroleptis boulengeri de Witte, 1921a, Revue Zool. Africaine, **9**, p. 12, pl. iv, fig. 2: St. Louis Plain bordering Lake Tanganyika, Belgian Congo.

20 juv. (M.C.Z. 27520-5) Misuku Mtns. 23–30.ix.48.
16 ♂♂, 18 ♀♀, 3 juv. (M.C.Z. 27509–19) Nchisi Mtn. 30.xi.48.
11 (M.C.Z. 27493–9) Zomba Mtn. 2–12.ix.48.
58 (M.C.Z. 27501–6) Chiradzulu Mtn. 26–31.viii.48.
♂ ♀ (M.C.Z. 27507–8) Cholo Mtn. 12.iii.49.
♂ (M.C.Z. 27457) Likabula River. 2.viii.48.

Records. New to Nyasaland.

Remarks. As direct comparison with the only known specimen[1] of *boulengeri* is not possible, the identification is open to question. I refer these frogs to *boulengeri* rather than to *lamcerei* — which has paragraph precedence should the two prove to be synonymous — because the metatarsal tubercle is much shorter than the inner toe. In the 11–18 mm. juveniles or subadults the tips of the fingers and toes are simple (as in the 14 mm. *lamcerei*) or swollen, but definitely dilated (as in the 16 mm. *boulengeri*) in all, or most, of the forty 14–24 mm. adults.

Variation. Every frog in the above series has been examined for each of the undermentioned characters excepting for those of the tympanum and first finger, in which case only a few from each locality were tested.

Tympanum distinct, or indistinct in very young, more than half to two-thirds the orbital diameter; first finger shorter than second; tips of fingers and toes usually slightly swollen or distinctly dilated, though sometimes not, their bases without web; tibio-tarsal articulation of the adpressed hind limb reaches the tympanum (in 33), the eye (in 82), or just beyond (in 16) — this may well be largely an age character for in the Misuku juveniles the articulation reaches the tympanum in 1, eye in 13, beyond in 6; while in the Nchisi series, mostly adults, it reaches the tympanum in 29, the eye in 8; a small inner metatarsal tubercle only. Third finger of ♂ (M.C.Z. 27507) three times as long as the fourth, of ♀ (M.C.Z. 27508) only about twice.

Color in life. ♂ (Cholo). Above, gray with sepia markings, principally a triple hour-glass pattern on dorsum, a stripe from nostril through eye to groin but interrupted on flank, and a prominent crossbar on tibia; thighs slightly pinkish. Below, white.

♀ (Cholo). Above, pinkish, finely and very extensively vermiculated with brown; the only other marking is an obsolescent stripe from nostril through eye to tympanum; thighs clear red. Below, white,

[1] Laurent has recently recorded 4 more from Angola.

some dusky flecks on skin while a plumbeous appearance is imparted to breast and belly by the internal organs.

Subadults (Chiradzulu). While most of the series displayed a dorsal hour-glass pattern in varying shades, a few were utterly different. The back of one was entirely occupied by a broad reddish chestnut, vertebral stripe, another had a pair of fawn-colored dorso-lateral stripes.

Size. Snout to anus of Nchisi adult ♂♂, 14–17 mm., but largest ♂ (M.C.Z. 27507), 18 mm. (19 in life); gravid Nchisi ♀♀, 18–20 mm., but largest ♀ (M.C.Z. 27508), 24 mm. (25 in life). Misuku frogs 12–18 mm., the Zomba and Chiradzulu series 11–18 mm.

Breeding. Not breeding between August 26 and September 30; but following rain on November 30, and on March 12, practically every ♀ was gravid. Strangely enough the Cholo ♂ was not taken with the gravid ♀, but an hour later came hopping into my tent following a rainstorm.

Habits & Habitats. The big Misuku series were mostly taken beside a stream flowing through Matipa Forest.

The Nchisi frogs were among damp leaves in a ravine close to the Boma where they were captured after heavy rain. Most of the Zomba frogs were secured in a small stream flowing down a ravine clothed in evergreen forest where it is crossed by the path to Chingwe's Hole, others were from a tiny tributary of the Mulungusi River, beside which one was dug from a hole that it shared with a young *Bufo r. regularis;* another was hiding beneath bark adjacent to a sawpit in the cedar forest. The Cholo ♀ was hopping over leaves in the forest just before rain, though the environment was already damp.

The entire Chiradzulu series were found beneath boulders and stones in the small rock-girt stream which supplies the District Commissioner's vegetable garden at 4000 to 4500 feet. As each large stone was lifted from its resting place in the shallow pools, the tiny frogs leaped about in all directions. A quite confusing tactic that tends to paralyse action by promoting indecision as to which of a score of bouncing froglets to pursue.

Arthroleptis reichei Nieden

Arthroleptis reichei Nieden, 1910b, Sitzb. Ges. Naturf. Freunde Berlin, p. 437: Crater Lake, Ngosi Volcano, Poroto Mountains, Tanganyika Territory.

♀ (M.C.Z. 27456) Misuku Mtns. 5.x.48.

Records. New to Nyasaland but to be expected as I have taken it in the Poroto, Rungwe, Ukinga and Uzungwe Mountains to the north.

Variation. Tympanum distinct, about half orbital diameter; first finger shorter than second; tips of fingers and toes slightly or strongly dilated, their bases without webs; tibio-tarsal articulation of the adpressed hind limb reaches the eye; a rather blunt inner metatarsal tubercle whose length is included about 1½ times in the free portion of the first toe.

Size. Snout to anus of gravid ♀, 34 mm.

Breeding. See above.

Habitat. Beneath a log in the evergreen Matipa Forest.

Arthroleptis adolfifriederici francei[1] subsp. nov.

Arthroleptis macrodactyla Günther (not of Boulenger), 1894a (1893), pp. 619 620; Bocage, 1896a, p. 104; Johnston, 1897, p. 362; 1898, p. 361a. [All these records are based on a single, now macerated, 32 mm. frog (B.M 93.10.26.80) allegedly from Zomba, from where it was sent to the British Museum where I examined it. *A. macrodactylus* Boulenger (1882b, p. 117, pl. xi, fig. 5) of Gabon, now generally regarded as a synonym (♂) of *poecilonotus* (♀) Peters (1863) of Boutry, Gold Coast, is almost exactly the size of the Nyasaland frogs which, however, do not appear to be even subspecifically related.]

Holotype. M.C.Z. No. 27479, a gravid ♀ from the forested banks of the Ruo River just below the Ruo Falls on Mlanje Mountain, about 5000 feet. Collected by Arthur Loveridge, April 4, 1949.

Paratypes. M.C.Z. Nos. 27470–8 and twenty uncatalogued duplicates taken at the same time and place as the type.

Diagnosis. Obviously related to *adolfifriederici* Nieden of Central Africa, from which it differs in the much less developed dilations of fingers and toes (strongly dilated in *adolfifriederici*), the shorter hind limbs (which when adpressed in *adolfifriederici* reach from between eye and nostril to beyond end of snout), and general ground color (varying shades of nut brown in *adolfifriederici*).

Description. Type ♀. Head not wider than body (also in paratypes); tympanum distinct, half the orbital diameter (in entire series); first finger slightly shorter than second which extends as far as fifth when pressed together, fourth (on its outer side) less than twice as long

[1] After Mr. F. H. France, the keen young forestry officer who, in May 1949, lost his life in trying to cross the Ruo close to the spot from whence came these frogs. They are called after France that his name may be linked with the forests he sought to preserve on the mountain he loved so well.

as the fifth (twice as long in the ♂ paratypes); tips of fingers slightly, of toes strongly, swollen, their bases without webbing; tibio-tarsal articulation of the adpressed hind limb reaches the eye (as is the case with 26 of the paratypes) or between eye and nostril (in 3 instances); an inner, but no outer, metatarsal tubercle whose length is shorter than the first toe.

Color of ♀ type in life. Above, dark brownish red; from nostril through eye above (and on upper portion of) tympanum to above forearm, a deep black band edged with lighter above, especially pale on eyelid; from eyelid to eyelid an obsolescent crossbar; similar dusky markings occur as marblings on back, flanks, limbs and around anus. Below, pinkish white with underlying dusky markings and silvery white flecks on chest, sides of abdomen, posterior aspects of thighs, and on the almost blackish soles of hind feet; palms, fingers and toes more reddish.

A slightly smaller ♀ had the snout and anterior half of head pale pinkish buff, the black interorbital crossbar merging into the general black of the vertebral region which is dorso-laterally bounded by the same shade as the snout; on each flank, especially posteriorly, and on each hind limb, are a score of cream colored spots about whose edges are superposed small red dots that enhance this frog's striking appearance.

In alcohol the entire series is predominantly gray, but in life the ground color was gray, buff, fawn, pale green, or rich brick red. The vertebral hour-glass pattern characteristic of *Arthroleptis*, conspicuous in some, appears to be absent in others, but can usually be detected with the aid of a lens; dark dorso-lateral lines are present on two young frogs causing them to look a little like pinkish *Hyperolius*. Even more imposing is a 20 mm. juvenile that is black except for the tip of its snout, which is buffy, an almost whitish interorbital bar, and numerous white spots on back and limbs. Below, all are substantially the same as described for the type except that grayish, not pinkish, predominates.

Size. Snout to anus of paratype ♂ (M.C.Z. 27476), 32 mm.; of type ♀, 46 (49 just after death) mm.; the entire series ranges from 10 to 46 mm., but only nine frogs are over 30 mm.

Breeding. In April the ova were only moderately large.

Habitat. Unlike the equatorial forests of Tanganyika, Nyasaland forests at high altitudes apparently become too cold for amphibians owing to the drop in temperature when it comes on to rain. In a three-

hour (7 to 10 A.M.) walk up through the forest from the Power House under conditions that appeared ideal, I did not see a single frog. During the first two hours the enveloping cloud cap rendered it dull but afterwards intermittent shafts of sunlight illuminated stretches of the leaf-strewn path. It was on our way down from the Ruo Plateau that I caught the first frog among moss-grown boulders on the east bank, then, after recrossing the Ruo immediately below the Falls, a large one among leaves on the west bank. By this time it was again overcast and dark with rain threatening. Ten minutes later we took the other twenty-eight frogs within an area of a 100 square yards between the path and the river bank. It began to rain but not another frog was seen during the rest of the way down the mountain to the power house.

Arthroleptis stenodactylus whytii Boulenger

Arthroleptis whytii Boulenger (? part), 1897e, Proc. Zool. Soc. London, pp. 801–802, pl. xlvi, fig. 3: "Masuku Mts." (restricted), i.e. Misuku Mountains, Nyasaland. Boulenger (part), 1898b, p. 474; Johnston, 1898, p. 361a.

♂ (M.C.Z. 27444) Misuku Mtns. 6.x.48.
♂, 5 ♀♀ (M.C.Z. 27445–9) Nchisi Mtn. 30.xi.–2.xii.48.
♂ (M.C.Z. 27450) Cholo Mtn. 25.iii.49.
3 ♂♂, 7 ♀♀, 26 juv. (M.C.Z. 27460–9) Mlanje Mtn. 11–13.viii.48.

Records. The type locality had better be restricted to the "Masuku Mtns." (B), for as has been shown elsewhere the material allegedly collected by Whyte on the "Nyika Plateau at 6000–7000 ft." consisted largely of lakeshore fauna that does not occur so high. The third locality "Kondowe to Karonga" is on the lake shore just south of Mwaya. This led me (1933h, p. 378) to refer two immature (20–21 mm.) frogs from Mwaya to *whytii*. When submitted to my colleague, Mr. Benjamin Shreve, for an impartial opinion without reference to locality, he assigned them to typical *stenodactylus*. Subsequently I was able to examine both "Nyika" and "Kondowe to Karonga" frogs, now macerated, so that their limbs extend as far forward as in *whytii* and renders them difficult to place; also they are young and the metatarsal tubercles are subequal in length to their respective distances from the tip of the inner toes.

Affinities. While the mountain and lowland races are unquestionably distinct, differing greatly in size; individuals, especially young frogs,

are almost impossible to separate. Swollen finger tips are not always developed in *whytii* and the shovel-shaped metatarsal tubercle of that forest form is not always blunter than in typical *stenodactylus* which has to burrow into harder terrain. The tubercle in the Nehisi frogs, for example, appears just as acuminate as in most *stenodactylus*. In *whytii* ♀ ♀ the throat and breast is usually variegated with dusky, in *stenodactylus* ♀ ♀ it is white. The ♂♂ of both races have the sublabial region and throat anteriorly almost black.

As Boulenger gave the snout to anus length of *whytii* as 40 mm. it is reasonable to restrict the name to the mountain form. This means that *lönnbergi* Nieden (1915: Usambara Mtns.); *s. uluguruensis* Loveridge (1932: Uluguru Mtns.); *ragus* Ahl (1939: Usambara Mtns.); and *ukamiensis* Ahl (1939: Uluguru Mtns. is where the Wakami dwell) must all be referred to the synonymy of *whytii*. Of this race we have also many examples from Chirinda Forest, Selinda Mtn., Southern Rhodesia. While the two races are most distinct in Tanganyika, they are less so in Nyasaland and probably least so in Southern Rhodesia. I am indebted to Mr. Shreve for painstakingly examining every individual in our very extensive series of the two forms.

Native name of Whyte's *Arthroleptis*. *Mboru* (Chewa; Ngoni).

Variation. Diameter of tympanum half, or rather less than half, the orbital diameter; only an occasional finger or toe dilated at the tip; tibio-tarsal articulation of the adpressed hind limb barely reaches the tympanum or eye; ♂♂ with a relatively longer third finger.

Color. The adult ♂♂ are distinguished by dusky chins. In life the frogs from Lichenya Plateau, Mlanje, were "pale leaf-brown with dark brown markings; a pinkish tinge chiefly noticeable on fingers and toes." Most Nehisi frogs were variegated yellowish buff, like the leaves carpeting the forest floor over which they were hopping, but the largest ♀ was gray.

Size. Snout to anus of ♂♂, 23–35 mm.; of adult ♀ ♀, 29–44 mm.

Breeding. In August ova were small. On December 2 a pair, the ♀ gravid, were found beneath a fallen tree trunk where the ♀ may have retired to lay (for in this species eggs are deposited in a burrow and metamorphosis takes place in the egg). Four of the 5 Nehisi ♀ ♀ were distended with ova.

Diet. Chiefly crickets in those examined.

Enemies. One frog was recovered from the stomach of a sylvicoline snake (*Crotaphopeltis h. tornieri*).

Hibernation. In mid-August on Mlanje Mtn. these frogs were in a

state of semi-hibernation. One was at a height of five feet from the ground under moss on the bark of a slightly sloping tree growing on the bank of a stream. Two were two-and-a-half feet from the ground embedded in damp powdered wood inside a hollow tree in a shady ravine through which a trickle of water was flowing. The three ♂♂ were all together in the soil beneath a log on the bank of a streamlet meandering among moss-grown boulders and high banks in a copse behind "Araloon." One ♀ was in the water, another deep in earth among roots on the bank opposite to the ♂♂; six young were under a sod in damp ground beside the streamlet.

Habitat. The Misuku ♂ was beneath a log in dry forest. All the Nchisi frogs were taken in forest just before or after a downpour. The Cholo specimen was brought in by a Native towards the end of a second day of continuous rain which undoubtedly had activated it.

Arthroleptis stenodactylus stenodactylus Pfeffer

Arthroleptis stenodactylus Pfeffer, 1893 (1892), Jahrb. Hamburg Wiss. Anst., **10**, p. 93, pl. i, fig. 2: Kihengo, Tanganyika Territory.
Arthroleptis whytii Boulenger (part), 1897e, pp. 801–802.
Arthroleptis variabilis Hoffman (not of Matschie), 1944b, p. 176.
Arthroleptis stenodactylus lönnbergii Hoffman (not of Nieden), 1944b, p. 176.

juv. ♀ (M.C.Z. 27776) Chitala (Exch. Nas. Mus. Bloemfontein).
3 ♀♀ (M.C.Z. 27451–3) Chitala River. 14.xii.48.
♀ (M.C.Z. 27454) Blantyre. 31.xii.46.
♂ (M.C.Z. 27455) Likabula River. 2.viii.48.

Records. The Blantyre frog was given me by B. L. Mitchell, Esq. Chitala (as Chitiala: H); Karonga to Kondowe (B); "Nyika Plateau" (? in error: B). Also frogs from Mzimba (W. Y. Turner) and Zomba (J. R. Lennon) in the British Museum.

Remarks. Chitala frogs collected by Mitchell were referred by Hoffman to *lönnbergi* on the grounds that they lacked a lingual papilla. It is present in one of the two specimens loaned me by Dr. Hoffman but I cannot detect it in the other (M.C.Z. 27776) or in one of our three Chitala specimens; it is present in the others though easily overlooked.

Variation. Diameter of tympanum about half (almost a third in M.C.Z. 27453) the orbital diameter; an occasional finger or toe dilated in the Chitala frogs only; tibio-tarsal articulation of the adpressed hind limb reaches the elbow (2) or tympanum (3); ♂♂ with a rela-

tively longer third finger.

Color. Rose pink on the red laterite soil of the Chitala district.

Size. Snout to anus of ♂, 23 mm.; of ♀ ♀, 30–34 mm.

Enemies. One frog recovered from the stomach of a sand-snake (*Psammophis s. sudanensis*).

Habitat. The Likabula specimen was in a marsh beside the river.

Hemisus marmoratus marmoratus (Peters)

Engystoma marmoratum Peters, 1854, Ber. Akad. Wiss. Berlin, p. 628: Cabaçeira, Mozambique.

Hemisus marmoratus Mitchell, 1946, p. 31.

2 ♂♂, 2 ♀ ♀ (M.C.Z. 27670–3) Mtimbuka. 11.ii.49.
♂ imm. (M.C.Z. 27674) Chowe. 12.ii.49.

Records. Mitchell, who is the first to record this species from Nyasaland, mentions no localities, but tells me his material was collected at Blantyre, Chitala, Cholo, Limbe, and Zomba. He errs (p. 31), however, in saying that the breeding habits of *marmoratus* have not been described.

Native name of the Sharp-nosed Frog. *Kaswanene* (Yao, but applied to *Breviceps* also).

Variation. First finger subequal to second; second toe as long as, or shorter than, the shovel-shaped inner metatarsal tubercle; third toe (on its longer side) equals distance from anterior corner of eye to end of snout. A semicircular skin-fold partly surrounds the shovel-shaped tubercle but there is no second tubercle, the second swelling in the middle of the foot which Peters mentions may have been a prominence resulting from a slightly shrunken condition of the foot.

Color. Below, creamy white, the ♂♂ thickly, the ♀ ♀ sparsely, stippled with minute brown spots.

Size. Snout to anus of ♂♂, 28–29 mm.; of ♀ ♀, 30–35 mm.; immature ♂, 24 mm.

Habitat. Beneath fallen palm trunks at Mtimbuka; under rubbish in Dr. Lamborn's garden at Chowe; their presence above ground resulting from a heavy downpour.

BREVICIPITIDAE

Breviceps mossambicus Peters

Breviceps mossambicus Peters, 1854, Ber. Akad. Wiss. Berlin, p. 628: Mozam-

bique Island and Sena, Zambezi River, Mozambique. Günther, 1893 (1892), p. 555; Boulenger, 1897e, p. 801; Johnston, 1897, p. 362; 1898, p. 361a; Mitchell, 1946, p. 31.

Breviceps verrucosus Boulenger (not of Rapp), 1891a, p. 309.

Breviceps mitchelli Hoffman, 1944b, Soölog. Navors. Nas. Mus. Bloemfontein, **1**, p. 182, fig. 10: "Chitiala," i.e. Chitala River, Nyasaland. Mitchell, 1946, pp. 31, 42; Rose, 1950, p. 95, fig. 56.

1 (M.C.Z. 27675) Misuku Mtns. 13.x.48.
1 (M.C.Z. 27676) Kasungu. 15.ix.48.
2 (M.C.Z. 27677–8) Mtimbuka. 18.ii.49.
2 (M.C.Z. 27679–80) Lujeri R. 2.iv.49.
25 (M.C.Z. 27681–700) Cholo Mtn. 12–26.iii.49.

Records. Chitala (as "Chitiala" for *mitchelli:* H); Fort Hill (B); Lake Nyasa (B); Misuku Mtns. (as Masuku: B); Shire Highlands (G). I have also seen specimens from Fort Johnston (Sir H. H. Johnston) and Zomba (J. R. Lennon) in the British Museum; while Mr. Mitchell tells me he has taken "*mitchelli*" at Blantyre, Cholo, Limbe, Zomba and Zomba Mtn.

Native names. Chibwatiko (Ngoni); *kaswancne* (Yao); *lukumbu* (Misuku); *nantusi* (Manganja); *nasancne* (Nyanja).

Synonymy. The description of *mitchelli* was based on a 26 mm. frog which, through Dr. Hoffman's kindness, I have been allowed to see. Though said to be an adult it had not been dissected and the sex was not stated. Incidentally the testes are recognizable in a ♂ (M.C.Z. 27680) of only 23 mm. in length. There is a surprising dimensional difference between sexes in the genus *Breviceps.* Hoffman omitted to say how his solitary specimen supposedly differed from *mossambicus,* but I agree with his description of *mitchelli* where he says: "interorbital space nearly 1¾ times as broad as upper eyelid;" and of the outer metatarsal tubercle "small, conical and distinct from the inner." Now Parker's (1934, p. 187) monograph of the family, used by Hoffman, states of *mossambicus:* "interorbital space a little broader than the upper eyelid;" and of the outer metatarsal tubercle "small, compressed, almost continuous with the inner." Both conditions exist in the Cholo series. The interorbital width merges into the upper eyelid in so many Cholo frogs that it is quite impossible to say where one ends or the other begins, i.e. the character is valueless; in young frogs the tubercles tend to be separate but grow together in old individuals; Parker's description is much the more accurate. Though I failed to get any topotypic *mitchelli* on account of the prevailing drought, the

habitat is just what one would expect for *mossambicus* which is known from all the countries surrounding Nyasaland. I see no grounds for supposing that *mitchelli* can be distinguished from *mossambicus*.

Variation. Orbital diameter contained 6.6 (M.C.Z. 27678) to 13 (M.C.Z. 27697) times in length from snout to anus when the length of the orbit in millimetres is divided into the length from snout to anus taken by dividers; orbital diameter contained 7 (M.C.Z. 27678) to 16 (M.C.Z. 27695) times in length from snout to anus if the length of the orbit is taken with dividers and marked off across the back from snout to anus. Not only is there clearly a change in proportions with growth, but an element of error results from whether the eye is open or closed and whether the frog is excessively fat. Consequently the major division (II) of Parker's (1934, p. 187) key, which calls for the length of the eye to be "contained less than 9 times in the length from snout to vent;" is valueless. The rest of the key characters for *mossambicus* hold, viz: Fingers and toes distinct; outer finger less than two-thirds the length of the second and extending somewhere between the subarticular tubercles of the third; outer toe (fifth) sometimes vestigial (M.C.Z. 27676; 27684), never extending beyond the junction of the third and fourth. Skin pitted, but not warty.

Color in life. Unsexed Cholo adult. Above, yellow brown, paler on head and almost white on the blunt-ended, wedge-shaped streak that covers the nostril and both upper and lower jaws; it is followed by a broad black band extending from eye to anterior edge of forearm; behind this is a conspicuous, sub-triangular, yellowish-cream patch extending from the posterior corner of the eye to the parotid gland and tapering downwards on to the upper arm, also continued posteriorly along the whitish flanks as an ill-defined lateral line, marbled and speckled both above and below with sepia blotches and spots; limbs dark. Below, chin and throat black (in both sexes) breaking up into black spots on the chest which is otherwise white like the belly and inner aspects of limbs. Usually the chest and belly are whitish minutely stippled with brown, but occasional individuals *of both sexes* may exhibit large irregular dark blotches.

Size. Snout to anus of four ♂♂, 23–35 mm.; of four ♀♀, 36–52 mm.; of entire series, 16.5 to 52 mm.

Breeding. In March, surprisingly enough, the ova were enlarged in only one of the four ♀♀ examined, nor were the others spent, but all those dissected had large reserves of fat.

Diet. Only ants and termites in the stomachs of those examined.

Enemies. Young *Breviceps* were in stomachs of three vine-snakes (*Thelotornis k. capensis*) and one white-lipped snake (*Crotaphopeltis h. hotamboeia*) taken at Cholo on March 17, 19, 21 and 22.

Defense. Under the stimulus of chloroform or cyanide these frogs exude a thick, white, and very sticky secretion from the dorsal glands.

Habitat. The Kasungu frog was found beneath a canvas bag in my tent, doubtless having been induced to emerge during the drought by water seeping from my canvas bath. At Mtimbuka, though there had been no rain for a week, the smallest frog was out on a path at 9 A.M., the second was found sheltering beneath palm fronds. One Lujeri frog was dug from the ground beneath a log where it was in close proximity to an ants' nest. Heavy rain was responsible for the fine Cholo series most of which were brought in by tea-pickers from Mianga Plantation.

Phrynomerus bifasciatus bifasciatus (Smith)

Brachymerus bifasciatus A. Smith, 1849, Illus. Zool. S. Africa, Rept., pl. lxiii: "Country to the east and north-east of Cape Colony."

Phrynomantis bifasciatus Boulenger, 1882b, p. 172; 1891a, p. 308; 1897e, p. 801; Johnston, 1898, p. 361a.

Phrynomerus bifasciatus Mitchell, 1946, p. 30.

Phrynomerus bifasciatus nyasalandensis Hoffman, 1944b, Soolog. Navors. Nas. Mus. Bloemfontein, **1**, p. 181, fig. 9: "Chitiala," i.e. Chitala River, Nyasaland.

Records. Chitala (for *nyasalandensis:* H); "Nyika Plateau" (B: undoubtedly erroneous); Shire Valley (B); also Zomba (in Brit. Mus.). Mitchell tells me he has collected *bifasciatus* at Chikwawa; Chiromo; Chitala; Fort Johnston and Port Herald.

Synonymy. Hoffman described *nyasalandensis* on the basis of a single 30 mm. juvenile ♀, citing the following differences:

Character	*nyasalandensis*	*bifasciatus*
Snout	more pointed	less pointed
Second finger	equal to fourth	shorter than fourth
Third toe	slightly longer than fifth	shorter than fifth
Hind limb	longer	shorter

In any long series of *bifasciatus* a certain amount of variation in the shape of the snout is to be seen, sometimes quite striking. Though the second finger is normally shorter than the fourth, for example in juveniles (M.C.Z. 25524–5) from Lindi, others (M.C.Z. 25222–3) in

the same series have the second and fourth equal, as also in four adults (M.C.Z. 21379–82) from Pretoria, Transvaal. While normally the third toe is shorter than the fifth, third and fifth are occasionally equal, for example M.C.Z. 16412 in a normal series (M.C.Z. 16410–25) from Mwaya, Lake Nyasa. Presumably comparative material for an extensive study was not available to the describer of *nyasalandensis*, whose alleged differences are only of an individual nature.

Since writing the foregoing, through the courtesy of Dr. Hoffman, I have been privileged to examine the type of *nyasalandensis* and consider it agrees with *bifasciatus* in three of the four characters listed above, differing only in the second finger being of unusual proportions. The impression of a more pointed snout may be due to the juvenile type having been undernourished during its period of captivity.

Color. During my visit to the London Zoological Gardens, Miss M. Southwick showed me three fine adult *bifasciatus* that were normally colored when received in January, 1948. About June, 1952, one of the three turned white and was still white when I saw it in August, 1952.

Habitat. The three frogs mentioned above had been taken by Mr. B. L. Mitchell in the petioles of banana plants at Chiromo, Nyasaland.

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[1] Where a date is followed by a letter of the alphabet it indicates that during the year cited the author in question published more than one paper on African herpetology. The letter has chronological significance in a more comprehensive bibliography of African herpetology (1880–1953) which it is hoped may be published in the not too-distant future.

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SYNOPTIC KEY TO AID IN THE IDENTIFICATION OF NYASALAND AMPHIBIANS

(WARNING! No easy aid of this nature should be followed blindly. It requires to be used with discretion and in conjunction with a full description of the species after due consideration of the probabilities and alternatives. This is especially the case when dealing with such genera as *Hyperolius* and *Arthroleptis* whose range of variation is often little known. Furthermore, supposing a second, as yet undiscovered, species or genus of caecilian is present in Nyasaland, the first alternative of the key would merely direct the enquirer to *Scolecomorphus kirkii*.)

1. Body without limbs, tailed, wormlike; habitat montane, subterranean, coming to surface during or after heavy rain (Caeciliidae) . . *S. k. kirkii*
   Body (except in tadpole stage) with four limbs, without (except when emerging from tadpole stage) tail, froglike . . . . . 2 (Salientia)
2. No tongue; three inner toes bear black horny-sheathed claws; toes very fully webbed as habits wholly aquatic; fingers finely tapering to their pointed tips . . . . . 3 (Pipidae)
   Tongue large; toes without claws; fingers not pointed 4
3. Subocular tentacle much shorter than half the orbital diameter; black claws, when viewed from above, appear flattened . . . . . *X. l. laevis*
   Subocular tentacle at least half the orbital diameter; black claws, when viewed from above, appear compressed . . . . . *X. mülleri*
4. Upper jaw toothless 5
   Upper jaw toothed 9
5. Skin more or less rough, warty . . . . . 6 (Bufonidae)
   Skin smooth or pitted, but not warty . . . . . 49 (Brevicipitidae)
6. Tympanum large and conspicuous (except in very young); a tarsal fold;

first finger subequal to, or longer than, second when pressed together . . 7
No tympanum; no tarsal fold; first finger shorter than second when pressed together 8

7. Transverse diameter of tympanum subequal to, or slightly larger than, that of eye; parotid glands absent or indistinct; a post-temporal and dorsolateral glandular fold separates back and flanks; first and second fingers subequal when pressed together; toes slightly webbed . . *B. carens*
Transverse diameter of tympanum usually much smaller than that of eye; parotid glands large and distinct; no post-temporal or dorsolateral glandular folds; first finger longer than second when pressed together; toes half to two-thirds webbed . . . . . *B. r. regularis*

8. Back with a light, hair-like, vertebral line (best seen with a lens); breast and belly usually immaculate or at most with a few dark vermiculations; adults ♂♂ 28–34.; ♀♀ 35–42 mm.; known only from the Nyika Plateau at 7000 feet . . . . . *B. t. nyikae*
Back without any vertebral line; breast and belly with a large, anteriorly three-pronged, dark patch surrounded by dark spots and vermiculations; ranges from Kenya to Mozambique at relatively low altitudes, unknown from Nyasaland but likely to occur there . . . . (*B. t. taitanus*)

9. Tips of fingers and toes ending in disks (except in *Kassina*[1]); disk joint separated from next by an intercalary cartilage (dissection necessary); habitat chiefly in bananas, sedges, shrubs and trees . . . . . 10 (Rhacophoridae)
Tips of fingers and toes not dilated (except in some *Arthroleptis*[2]); terminal joint not separated from next by cartilage (dissection necessary); habitats: aquatic, terrestrial, fossorial, but not arboreal . . . . . 24 (Ranidae)

10. Two innermost fingers opposed to the two outer; pupil horizontal; a large putty-colored or brownish tree-frog which makes a froth nest . . . . . *C. xerampelina*
All four fingers in the same plane 11

11. Tips of fingers and toes not dilated, fingers free of web, toes almost so; vomerine teeth present on palate between the choanae (nasal openings) *K. senegalensis*
Tips of fingers dilated; toes usually webbed extensively 12

12. Tympanum distinct; vomerine teeth present on palate between the choanae (nasal openings); pupil vertical 13
Tympanum usually hidden; vomerine teeth lacking; pupil vertical or

[1] An inch-long, silvery gray to pale bronze frog whose back bears three black-edged, brown streaks which may be broken up into shorter streaks or blotches; similar blotches along jaw and sides. Males may be recognized by their black throats bearing a straight-sided disk. Their distinctive call resembles the loud pop made by the removal of a reluctant cork from its bottle.

[2] All *Arthroleptis* lack vomerine teeth and have no noticeable web between their toes, are mostly of small size and are consequently apt to be mistaken for young *Rana*. Cf. pp. 405 - 406 for synoptic key and chart.

horizontal 15

13. Scarlet patches on armpit, groin, fore and hind aspects of thigh, inner and upper surfaces of foot; above black marbled or blotched with deeper black, each spot faintly margined in silver. Omosternum largely forked posteriorly; metasternum a large cartilaginous plate not, or but slightly, calcified . . . . . *H. maculatus*

No scarlet coloring, which is largely brown or green. Omosternum entire, broadened at base; metasternum without a bony style but usually strongly ossified . . . . . 14 (*Leptopelis*)

14. Tips of fingers and toes only slightly dilated; outer toe a quarter-webbed; heel of forward-pressed hind limb reaches shoulder . . . . . *L. bocagii*

Tips of fingers and toes terminate in large disks; outer toe webbed to disk; heel of forward-pressed hind limb reaches eye; young frogs vivid green, differing from green or brown adults in having a white spot on each elbow and heel . . . . . *L. flavoguttatus*

15. Pupil vertical (when dilated may usually be recognized by a nick above and below) . . . . . 16 (*Afrixalus*)

Pupil horizontal (when dilated may usually be recognized by a nick on either side) . . . . . 17 (*Hyperolius*)

16. Fingers well webbed; heel of the forward-pressed hind limb rarely fails to reach the eye and sometimes extends beyond; adults usually more than an inch in length from snout to anus . . . . . *A. f. fornasinii*

Fingers indistinctly webbed at base; heel of the forward-pressed hind limb reaches the shoulder but never the eye, adults usually less than an inch in length from snout to anus . . . . . *A. b. brachycnemis*

17. Fourth toe with 2 phalanges free of web; color very variable; occurs on Nyika Plateau at 7000 ft. . . . . *H. marginatus*

Fourth toe with at most 1 phalanx free of web; usually occurs at low levels and probably not above 6000 ft. 18

18. Fourth toe webbed to disk or with half a phalanx free of web; from snout to anus a white vertebral line on a black or marmorate background, alternatively frog devoid of markings but associating with the marmorated form . . . . . *H. m. albofasciatus*

Fourth toe usually with 1 phalanx free of web (or a narrow seam may extend to the disk in some examples of *c. tuberilinguis*) 19

19. From snout to eyelids no light Ω-shaped marking (unless possibly in unknown young); adult ♂♂ 33–36 mm., uniformly putty colored above except for an indication of a dusky streak from nostril to eye; ♀♀ (33–) 39 mm., uniformly plumbeous (green in life) above (except on thighs) . . . . . *H. c. tuberilinguis*

From snout over eyelids (and possibly continued along either side of back) a light (yellow or white), with or without black border, Ω-shaped marking; back with or without spots 20

20. Light Ω-shaped marking relatively slender, when edged with black, the

black lines are parallel....21
Light Ω-shaped marking broadens out behind eye....22

21. Color brown to pale brown (green when young); usually some spots scattered over back; size moderate, viz. ♂♂ 20–28 mm., ♀♀ 20–32 mm.; habitat: swamps of Lower Shire and Zambezi....*H. a. argus*
Color rosy brown; spots, if present, rudiments of a disintegrated dorso-lateral line; size relatively large, viz. ♂♂ 25–35 mm., ♀♀ 32–43 mm.; habitat: montane slopes of Misuku, Nyika, and Mlanje....*H. p. puncticulatus*

22. Color rosy brown; dorsal spots, if present, large, white, usually encircled with black; size largish, viz. ♂ 32 mm., ♀ 40 mm.; habitat: montane *H. p. cholocnsis*
Color pale; dorsal spots, if present, small, black; size moderate, viz ♂ 25 mm., ♀ 31 mm.; habitat: lake shore (but only known from types) *H. p. mitchelli*
Color pale green or straw; spots, if present, minute, serially arranged in a double dorso-lateral and a single vertebral series; size small, viz. ♂♂ 20–24 mm., ♀♀ 19–23 mm....*H. nasutus*

24. Vomerine teeth present (except in very young frogs recently emerged from tadpole stage)....25 (*Rana*)
Vomerine teeth absent....37

25. Inner metatarsal tubercle large, hard, shovel-shaped (though less distinctly so in young); tibio-tarsal articulation of the forward-pressed hind limb reaches only to the axilla; habit bloated or toad-like....36
Inner metatarsal tubercle moderate, softish, an elongate oval pad, not shovel-shaped; habit frog-like....26

26. Vomerine teeth in two slightly separated series directly between, but not touching, the choanae....27
Vomerine teeth in contact with the inner anterior borders of the choanae from which they extend posterio-obliquely inwards, the two series widely separated (narrowly in the alternative group assigned to No. 36 above)....29

27. From eyelids to groin a conspicuous, pale brown, flat, glandular, dorso-lateral fold; throat uniformly white....*R. g. bravana*
No dorsolateral fold, or, if indicated, neither conspicuous, pale brown, nor broad; throat more or less vermiculated with dusky markings....28

28. Overall length of tibia more than half the length from snout to anus....*R. f. angolensis*
Overall length of tibia about half (±) the length from snout to anus....*R. f. fuscigula*

29. Last phalanx of fifth toe fully, or partially, webbed....30
Last phalanx of fifth toe entirely free of web....32

30. Only 1 phalanx of fourth toe free of web; tibio-tarsal articulation of the forward-pressed hind limb reaches far beyond end of snout; light

markings on buttocks tend towards vermiculations; size large; habitat: montane streams ..... *R. o. gribinguiensis*

1½ to 2 phalanges of fourth toe free of web; tibio-tarsal articulation of the forward-pressed hind limb reaches eye or well (*but not far*) beyond end of snout; size relatively small; habitat: lowland streams and ponds 31

31. Tibio-tarsal articulation of the forward-pressed hind limb reaches end of snout or, more usually well beyond; buttocks with a more or less well-defined light stripe bordered by black ..... *R. o. oxyrhynchus*

Tibio-tarsal articulation of the forward-pressed hind limb only reaches eye or nostril; buttocks finely vermiculate with black ..... (*R. floweri*)

32. Only 2 phalanges of fourth toe free of web, and only 1 of the first toe free ..... *R. m. mascareniensis*

At least 3 phalanges of fourth toe free of web, and 2 of the first toe free . . 33

33. Only 1 phalanx of fifth toe free of web, and only 1½ of the second and third toes free 34

2 or more phalanges of fifth toe free of web, and 2 or 3 of the second and third toes free 35

34. An inner and a well-developed outer metatarsal tubercle on hind foot; habitat in lowlands ..... *R. m. mossambicus*

Only an inner metatarsal tubercle, though the position of an outer may be indicated by a spot; habitat in uplands ..... *R. m. uzungwensis*

35. 3 phalanges of fourth toe free of web, and only 2 of the third and fifth toes; males with a pair of black-lined gular sacs whose slits are situated below the angle of either lower jaw ..... *R. ansorgii*

4 phalanges of fourth toe free of web, and only 3 of the third and fifth toes ..... *R. f. fülleborni*

36. Front of lower jaw with three slight swellings; metatarsal tubercle of forward-pressed hind limb reaches shoulder or eye; back with rounded glandular warts ..... *R. d. delalandii*

Front of lower jaw with three well-developed bony cusps; metatarsal tubercle of forward-pressed hind limb reaches or, more often, fails to reach, the armpit; back smooth or with elongate glandular folds ..... *R. a. edulis*

37. A tarsal tubercle in addition to an outer and inner metatarsal tubercle 38 (*Phrynobatrachus*)

No tarsal and no outer metatarsal tubercle, only an inner metatarsal tubercle ..... 43 (*Arthroleptis* & *Hemisus*)[1]

38. Only 1 phalanx of fifth toe free of web; toes terminating in disks ..... *P. perpalmatus*

1½ to 3 phalanges of fifth toe free of web; tips of toes usually not dilated (except in *u. ukingensis*) 39

39. 1½ to 2 phalanges of fifth toe free of web, and 2½ to 3 of the fourth toe

[1] See also chart of characters on p. 406.

free 40

3 phalanges of fifth toe free of web, and 4 of the fourth toe free 41

40. Dwarf form (breeding ♂♂ 22–24 mm.; gravid ♀ 26.5 mm.) with usually rather more webbing ..... *P. duckeri*

Common form (breeding ♂♂ 26–35 mm.; gravid ♀♀ 28–35 mm.) with less extensive webbing ..... *P. natalensis*

41. Black above; heavily infuscated below; tibio-tarsal articulation of the forward-pressed hind limb usually fails to reach the eye; habitat: Nyika Plateau at 7000 ft or more ..... *P. u. nyikae*

Brown above; white below except for black throated ♂♂; tibio-tarsal articulation of the forward-pressed hind limb usually reaches the eye; habitat: below 5000 ft 42

42. Toes without disks or dilations; habitat: lowland or upland marshes ..... *u. mababiensis*

Toes with disks or dilations; habitat: within, or at edge of, northern montane forests ..... *u. ukingensis*

43. First finger shorter than second; metatarsal tubercle shorter than inner toe (except in some *s. whytei* where it is subequal); habitat: virgin forest 44

First finger as long as, or longer than, second; metatarsal tubercle as long as, or longer than, inner toe 47

44. Belly white heavily marbled with black at all ages from 8 to 23 mm. ..... *A. x. nyikae*

Belly white, uniform 45

45. Metatarsal tubercle half as long as inner toe; tips of fingers and toes usually slightly swollen or distinctly dilated; size small (breeding ♂♂ 14–18 mm., gravid ♀♀ 18–24 mm.) ..... *A. boulengeri*

Metatarsal tubercle at least three-quarters as long as inner toe; size larger, adults averaging about 10 mm. longer than *boulengeri* 46

46. Toes terminate in well-developed disks; metatarsal tubercle three-quarters the length of inner toe ..... *A. reichei*

Toes without disks, though their tips may be more or less swollen; metatarsal tubercle slightly shorter than inner toe; tibio-tarsal articulation of forward-pressed hind limb reaches eye or just beyond ..... *A. a. francei*

47. Metatarsal tubercle usually shorter than, occasionally as long as, inner toe; tibio-tarsal articulation of forward-pressed hind limb reaches tympanum or rarely eye ..... *A. s. whytii*

Metatarsal tubercle usually longer than, in young occasionally only as long as, inner toe 48

48. Snout rounded; mouth normally placed; metatarsal tubercle occasionally as long as (in young), usually longer than inner toe; tibio-tarsal articulation of forward-pressed hind limb reaches elbow or shoulder, very rarely the tympanum ..... *A. s. stenodactylus*

Snout pointed; mouth inferior, shark-like; metatarsal tubercle much longer than inner toe; tibio-tarsal articulation of forward-pressed hind limb fails to reach axilla in ♀ ♀, reaches axilla or shoulder in ♂ ♂ . . . . *H. m. marmoratus*

49. Fingers and toes pointed; inner metatarsal tubercle hard, shovel-shaped, *much* longer than inner toe . . . . . *B. mossambicus*

Fingers and toes with well-developed disks; inner metatarsal tubercle pad-like, round, *much* shorter than inner toe . . . . . *P. b. bifasciatus*

Synopsis of Characters in the Arthroleptis and Hemisus of Nyasaland

This synopsis is offered to aid the novice in the difficult task of separating members of these genera. The frequently striking differences in size, when sexed, are often masked by the prevalence of young frogs. Once known, the species can be readily recognized, though not the two forms of *stenodactylus* whose subadult characters are only average.

All agree in possessing a head that is no wider than the body; a skin that is smooth; toes practically devoid of web, showing, from the first to fifth toe the following phalanges free of web — 2, 2, 3, 4, 3; and there is only an inner (no outer) metatarsal tubercle.

Species	*Metatarsal tubercle as long as inner toe ?*	*Tibio-tarsal articulation of adpressed hind limb reaches*	*First finger shorter than the second when pressed together ?*	*Tips of the toes swollen or with distinct disks ?*	*Habitat*
A. x. nyikae	¼	tympanum or just beyond	Yes	slightly or distinctly	moist ground in evergreen montane forest
A. boulengeri	½	tympanum or beyond eye	Yes	slightly or strongly	"
A. reichei	¾	eye or end of snout	Yes	slightly or strongly	"
A. a. francei	slightly shorter	eye or just beyond	Yes	strongly	"
A. s. whytii	usually shorter; subequal	tympanum or rarely eye	subequal to or longer	occasionally a toe dilated sometimes not	"
A. s. stenodactylus	usually longer; subequal	elbow or shoulder, rarely tympanum	subequal to or longer	usually no toe dilated or swollen	arid savanna
H. m. marmoratus	longer	axilla in ♂ ♂, but not so far in ♀ ♀	subequal to or longer	No	"

PLATES

PLATE 1

Map showing Principal Collecting Localities

1948

Landing at Beira, Mozambique (17–19.vii), Loveridge proceeded by rail to Blantyre, Nyasaland (20–26.vii). Thence by truck to Likabula River (26.vii–6.viii) at foot of Mlanje Mtn., which was ascended to Lichenya Plateau (6–23.viii) with side trip to Chambe Plateau (20.viii). Thereafter Chiradzulu Mtn. (25.viii–1.ix); Zomba Plateau (1–13.ix); Dedza (13–14.ix); Kasungu Boma (14–15.ix); Mzimba Rest House (15–16.ix); Macdonald's Camp, Vipya Plateau (16–20.ix); Katumbi (20–21.ix); Chinunkha (21–22.ix); Matipa Forest, Misuku Mtns. (22.ix–18.x); Chinunkha (18–22.x); Cheri River Bridge, Northern Rhodesia (22–23.x); Nchenachena (23–25.x); Nyika Plateau (27.x–19.xi); down to Nchenachena (19–23.xi); Mzimba (23–24.xi); Kasungu (24–25.xi); Nchisi Mtn. (25.xi–13.xii); Chitala River at Empire Cotton Growers' Experimental Station (13–21.xii) with side trips to Mpatanjoka near Salima (15.xii) and Mnema, Makanjila on Lake Nyasa (16.xii); Dedza (21–22.xii); Blantyre (22.xii–3.i.49) with side trip to Hynde Dam, Limbe (27.xii).

1949

Ndirandi Mtn. (1.i). On road to Tete, Mozambique (3–4.i), roadside near Micombo east of Tete (4–5.i); Kasumbadedza Village on south bank of Zambezi 5 miles west of Tete — listed and labeled as "near Tete" (5–31.i); roadside near Mpatamanga Gorge Bridge (31.i); Blantyre (1.ii); Dally's Hotel, Chipoka, Lake Nyasa (2–3.ii); Mtimbuka, as Tembuka on labels (3.ii–7.iii) with side trips to Chowe (12.ii) and Kausi Village, Lake Malombe (25.ii); Blantyre (7–9.iii); Cholo Mtn. (9–28.iii); Magombe Estate, Cholo (28–29.iii); Ruo & Lujeri Rivers, Mlanje Mtn. (29.iii–11.iv); Blantyre (11–20.iv) with side trips to Limbe (16–17.iv) and Shire River at Chikwawa (18.iv). Left Nyasaland by air (20.iv.49.)

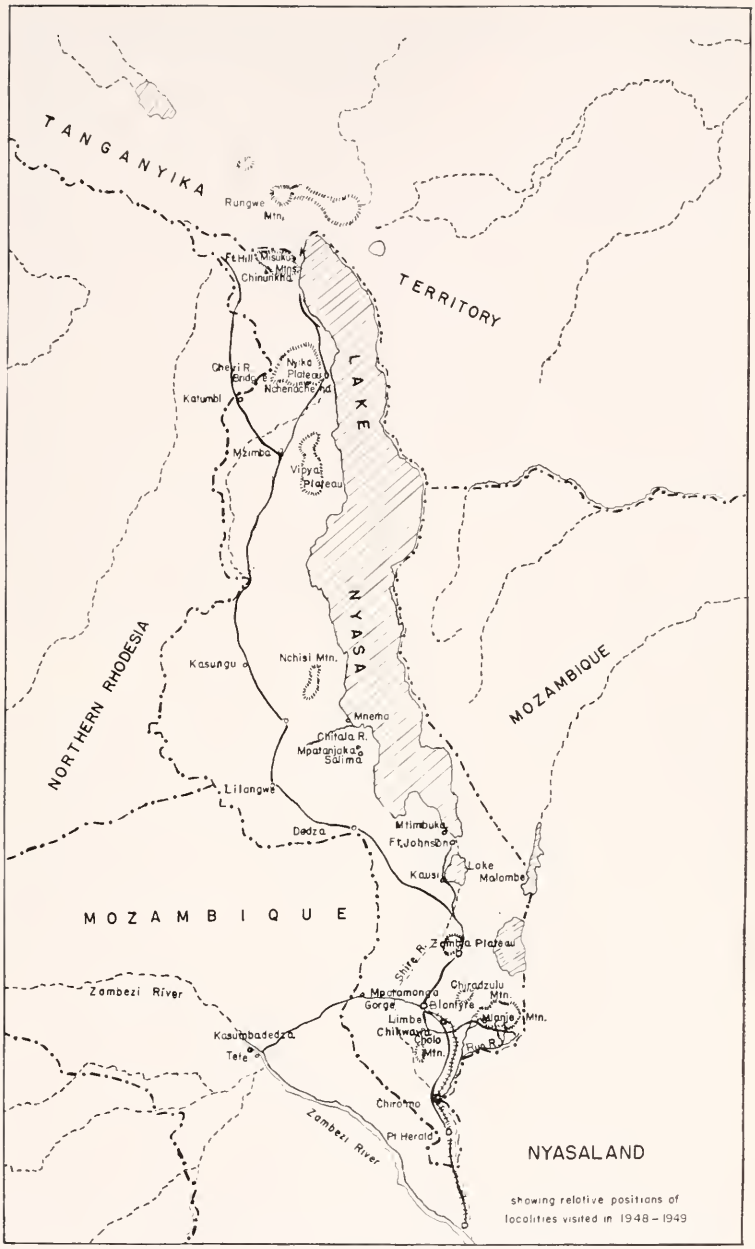
TANGANYIKA
TERRITORY
Rungwe Mtn.
Ft Hill
Chinunkha
Chevi R.
Bridge
Nyika Plateau
Nchenachena
Katumbi
Mzimba
Vipya Plateau
LAKE NYASA
NORTHERN RHODESIA
Kasungu
Nchisi Mtn.
Mnema
Chitala R.
Mpatanjaka
Salima
Lilongwe
Dedza
Mtimbuka
Ft Johnston
Kawsi
Lake Malombe
MOZAMBIQUE
MOZAMBIQUE
Shire R.
Zomba Plateau
Zambezi River
Mpatamanga Gorge
Chiradzulu Mtn.
Chilonjire
Mlanje Mtn.
Limbe
Chikwawa
Sholo Mtn.
Kasumbadeza
Tete
Ruo R.
Chiromo
Zambezi River
Pt Herald
NYASALAND
showing relative positions of localities visited in 1948 – 1949

PLATE 1

PLATE 2

Amphibian Habitats

Fig. 1. Stream flowing through evergreen montane forest at 6000 ft. This stream is in the Matipa Forest, one of the few surviving blocks on the Misuku Mountains. In boggy areas bordering the stream, or beneath nearby logs, we found *Phrynobatrachus ukingensis ukingensis*, *Arthroleptis boulengeri*, *A. reichei*, and *A. stenodactylus whytii*, of which last the Misukus (Masukus) are the type locality. All four of the species are characterized by the possession of digital disks.

Fig. 2. Sandy bed of the Chitala River at about 1900 ft.

The Chitala is typical of hundreds of Nyasaland rivers that cease to flow during the dry season. As our visit coincided with the prolonged drought of 1948–1949, frog-hunting was unusually arduous. In moist spots we met with *Phrynobatrachus perpalmatus* which has well-developed digital disks, also *P. u. mababiensis* and *A. s. stenodactylus* in which they are absent. Hoffman made Chitala the type locality for three frogs which do not appear to be distinct.

1

2

PLATE 2

PLATE 3

Amphibian Habitats

Fig. 1. Miss H. Sloan and Mrs. Loveridge frogging in a ditch.

Many lowland forms of amphibia have moved in and become established on the savanna and scrub-covered slopes of Nchisi Mountain. In this ditch and its immediate surroundings, following a few isolated rain storms, we got such common and widespread species as *Xenopus l. laevis*, *Bufo r. regularis*, *Phrynobatrachus natalensis*, and *R. f. fuscigula* with a single *R. f. angolensis* possibly coming from elsewhere.

Fig. 2. Thomas and Zacheyo capturing frogs on marshy ground.

In the Misuku Mountains, as on Nchisi, the savanna fauna is encroaching on former forested hillsides. Seepage through secondary growth provided congenial conditions for scores of tiny *Arthroleptis boulengeri*, a few *Phrynobatrachus natalensis* and one or two half-grown *R. f. angolensis*. Typical *fuscigula* occurred only a few miles farther down the mountain near Mwenichula's village.

1

2

PLATE 3

PLATE 4

Fig. 1. Aestivating quarters of Tree-frog (*Chiromantis xerampelina*).

During the long dry season human dwellings appear to offer just those conditions of shade and temperature approved by this adaptable, nest-building rhacophorid. After months of drought, however, when an isolated downpour lashed the open veranda with cold rain driven before a blustering wind, the three frogs deserted their bracket and sought shelter in Mr. H. C. Ducker's bedroom.

Fig. 2. Pug-nosed Frog (*Breviceps mossambicus*) in dry season.

At Kasungu we camped for the night in arid savanna to which water had to be fetched from afar. It was water seeping from my canvas bath that probably induced this fossorial species to come to the surface during the drought. At dawn the frog was found hiding beneath a duffle bag and protested, after the manner of its kind, by visibly inflating itself as it rose stiffly to its full height.

1

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PLATE 4

Bulletin of the Museum of Comparative Zoology

AT HARVARD COLLEGE

Vol. 110, No. 5

ZOOLOGICAL RESULTS OF A FIFTH EXPEDITION TO EAST AFRICA

V

CHILOPODA (MYRIOPODA)

By R. F. Lawrence

Natal Museum, Pietermaritzburg

With Three Text Figures

CAMBRIDGE, MASS., U.S.A.

PRINTED FOR THE MUSEUM

July, 1953

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Bulletin of the Museum of Comparative Zoology

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Chilopoda (Myriopoda)

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Natal Museum, Pietermaritzburg, South Africa

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INTRODUCTION

The material dealt with in this paper consists not only of the Chilopoda collected by Arthur Loveridge during his expedition to Nyasaland (1948–1949)[1] but includes the bulk of the material collected during his earlier visits to Equatorial East Africa at various times during the years 1915–1939. The dates of these expeditions are as follows:

1915–1919. "German East Africa" and Mozambique.
1920–1923. Kenya Colony and Tanganyika Territory.
1926–1927. Chiefly the Uluguru and Usambara Mountains, Tanganyika.
1929–1930. Tanganyika Territory; Northern Rhodesia and Uganda.
1933–1934. Debasien Mountain, Uganda to the coastlands of Kenya.
1938–1939. Uganda; eastern Belgian Congo; coastlands of Tanganyika.
1948–1949. Nyasaland and near Tete, Zambezi River, Mozambique.

The 1915–1919 collections were submitted to the late Mr. Stanley Hirst at the British Museum in 1920, and remained there until 1924. Mr. Hirst identified the centipedes only, and as he could hold out no hopes of the millipedes being determined, they were taken to the United States in 1924.

These earlier collections, together with the 1926–1927 material, were shipped in 1927 to Dr. Carl in Switzerland, where they remained for five years without any identifications as to species having been

[1] Made possible by a generous grant from the Penrose Fund of the American Philosophical Society.

made. At the end of that time they were returned to the Museum of Comparative Zoology. Dr. Carl wrote that the Polydesmoidea were the only group he had had time to study; some of these he had named generically, and there were undoubtedly new genera and species in the collection.

In the course of their trans-Atlantic voyages the Juliformia and Polydesmoidea suffered considerable fragmentation, but upon their return they, together with the 1929–1930 collections, were submitted to Dr. O. F. Cook in Washington. There they remained until 1948 when Dr. Cook's successor, Dr. E. A. Chapin, very kindly named most of the centipedes and personally brought the 1929–1930 collections back to Cambridge.

It has not been possible to include all the Chilopoda collected during the first five months of the Nyasaland expedition in 1948, as these have been temporarily mislaid and must be in one of the departments of the Museum of Comparative Zoology.

The recent monographs by Attems on the Geophilomorpha and Scolopendromorpha (1929 and 1930, Das Tierreich, Lief. 52 and 54), have given systematists a good working knowledge of the two larger groups of Chilopoda. According to these studies about 35 species of Scolopendromorpha and 10 of Geophilomorpha are known from the region under consideration. Comparing the area in which the collections were made with another African region of approximately equal size, Southern Africa, Attems has listed 46 species of Scolopendromorpha and 27 of Geophilomorpha from this region in his monograph of the South African Myriopod fauna (1928, Ann. S. Afr. Mus., 26).

It thus seems probable that, even if allowance is made for the South African subregion having been more systematically explored for Myriopoda than tropical East Africa, a supposition of which we can by no means be certain, the fauna of tropical East Africa is not as rich as that of South Africa. In the case of the Geophilomorpha at any rate this seems to be very probable.

Four species of Scolopendromorpha — *Scolopendra morsitans*, *Trachycormocephalus afer*, *Alipes grandidieri*, *Ethmostigmus trigonopodus* — and one of the Geophilomorpha, *Mecistocephalus insularis*, form a substantial proportion of the collection in numbers of individuals; all these species have a wide range and are found at all altitudes. In the southern region of Africa on the other hand the widely distributed species are fewer in number; there are more localised

forms and a more varied fauna.

The larger forms of centipedes are well represented in the collection. The total number of species recorded or described as new would undoubtedly have been greater, especially among the centipedes of smaller size, such as the genus *Cryptops*, had not a number of these more fragile specimens lost important structures, making it impossible to find sufficient characters for their determination. These smaller and more delicate forms suffer to a greater extent from the effects of travel and from packing and repacking, than do the larger and more robust centipedes.

The collection of Chilopoda dealt with in this paper consists of 288 individuals, not including a large number of the young stages of the wing-footed centipede, *Alipes grandidieri*. It comprises 21 species and subspecies divided among 12 genera; all the four suborders of Chilopoda are represented, but all the species, with two exceptions, are referable to the suborders Scolopendromorpha and Geophilomorpha.

Four forms are described as new; these are:

Cormocephalus multispinus quadridens subsp. nov.
Cryptops loveridgei sp. nov.
Cryptops kivuensis sp. nov.
Orphnaeus validus sp. nov.

In addition to these new forms the undermentioned species or subspecies are recorded for the first time from the respective countries in which they were collected:

NEW FOR UGANDA

Cormocephalus büttneri
Rhysida stuhlmanni

NEW FOR KENYA COLONY

Rhysida nuda togoenis

NEW FOR TANGANYIKA TERRITORY

Cormocephalus nitidus nitidus
Otostigmus cuneiventris
Rhysida intermedia
Rhysida afra afra

NEW FOR NYASALAND

Cormocephalus humilis

The following abbreviations have been employed in the listing of material:

B. C. = Belgian Congo
K. C. = Kenya Colony
M. = Mozambique
N. = Nyasaland
N. R. = Northern Rhodesia
T. T. = Tanganyika Territory
U. = Uganda

SYSTEMATIC DISCUSSION

Suborder SCUTIGEROMORPHA

Scutigera coleoptrata Linnaeus

♂. Madarazi, Uluguru Mtns., T.T. 22.x.26.

Suborder LITHOBIOMORPHA

Lithobius alluaudi Brölemann

Lithobius alluaudi Brölemann, 1924, Bull. Soc. Sci. Nat. Maroc, **4**, p. 188: Morocco.

♀ ♀. Tangier, Morocco. 4.x.38.

Two incomplete and rather badly contracted specimens are attributed with some doubt to this species.

Suborder SCOLOPENDROMORPHA

Scolopendra morsitans Linnaeus

Scolopendra morsitans Linnaeus, 1758, Syst. Nat., ed. 10, p. 638.

1.[1] Gongoni, 70 feet, coast of K.C. 27.vi.34.
8. Dar es Salaam, 42 feet, T.T. 1.ii.19; 6.xi.26; xi.29.
1. Bagamoyo, 100 feet, T.T. 18.xi.29.
4. Morogoro, 1628 feet, T.T. xi.16; v-x.17.
5. Mangasini, 4000 feet, Usandawi, T.T. 13.xii.29.
3. Kasumbadedza, 250 feet, Zambezi River, M. i.49.

Scolopendra canidens oraniensis Lucas

Scolopendra oraniensis H. Lucas, 1846, Rev. Zool., **9**, p. 287.

1. Tangier, Morocco. 4.x.38.

[1] Number of specimens collected.

Trachycormocephalus afer (Meinert)

Cormocephalus afer Meinert, 1886, Proc. Amer. Phil. Soc., **23**, p. 205.

6. Amaler River, 5000 feet, Debasien Mtn., U. xi.33.
2. Greeki River, 3000 feet, Karamoja, U. 11.xii.33.
1. Elgonyi, 7000 feet, Elgon Mtn., U. 20.i.34.
1. Tsavo, 1525 feet, Tsavo River, K.C. 6.iv.34.
8. Mbololo Mtn., 4800 feet, Uteita, K.C. 16.iv.34.
1. Voi, 1833 feet, Coast Province, K.C. iv.34.
2. Mtongwe, 50 feet, opp. Kilindini, K.C. 6.vii.48.
10. Longido Mtn. west foot, 2000 feet, T.T. 1.ii.16.
1. Mangasini, 4000 feet, Usandawi, T.T. 13.xii.29.
2. Amani, 3000 feet, Usambara Mtns., T.T. xi.26.
2. Siga Caves, 50 feet, near Tanga, T.T. vi.39.
1. Dar es Salaam, 42 feet, T.T. 11.xi.26.
24. Morogoro, 1628 feet, T.T. 1.xi.16-1.ii.18.
2. Mbanja, 400 feet, near Lindi, T.T. iv.39.

T. afer is one of the commonest of the larger centipedes in the collection. It is remarkable that not a single example of the other species known to occur in East Africa, *T. mirabilis*, was taken at any of the collecting stations. *T. afer* is easily distinguishable from *T. mirabilis* in having only the last tergite emarginate and in the first 5 or 6 antennal segments being hairless. These characters are very definite in all the specimens examined, and those in the collection previously diagnosed as *mirabilis* by Dr. E. A. Chapin, must be referred to *afer*.

Cormocephalus büttneri Kraepelin

Cormocephalus büttneri Kraepelin, 1903, Mitt. Mus. Hamburg, **20**, p. 193.

2. Idjwi Id., 6500 feet, Lake Kivu, B.C. ii.39.
4. Lichenya Plateau, 6000 feet, Mlanje Mtn., N. 9–21.viii.48.
3. Ruo River, 3000 feet, Mlanje Mtn., N. 4.iv.49.

This species closely resembles *Trachycormocephalus afer*, with which it shares a number of characters, but differs in the complete absence of tarsal spurs.

Cormocephalus humilis Attems

Cormocephalus humilis Attems, 1928, Zool. Anz., **78**, p. 294, figs. 10–12.

2. Lichenya Plateau, 6000 feet, Mlanje Mtn., N. 9–21.viii.48.
1. Chiradzulu Mtn., 3900 feet, N. 26.viii.48.
1. Kausi Village, 1400 feet, Lake Malombe, N. 25.ii.49.

Cormocephalus nitidus nitidus Porat

Cormocephalus nitidus Porat, 1872, Ofr. Ak. Forh., **28**, p. 1154.

3. Magrotto Mtn., 2500 feet, near Tanga, T.T. vii.39.

These specimens only differ from the typical form in having lateral emarginations present on the last tergite alone.

Cormocephalus multispinus quadridens subsp. nov.

Figure 1

Type. M.C.Z. A single adult from Chikwawa, Shire River at 120 feet, Nyasaland; collected by Arthur Loveridge, April 18, 1949.

Diagnosis. The single specimen differs very little from the typical form which is widely distributed in the eastern half of South Africa (Lawrence, 1947, Ann. Natal Mus., **11**, p. 139), but is distinguished from it mainly in having only 4 spiniform teeth on the coxopleural process, instead of 5 or 6.

Description. Longitudinal furrows of the head only distinct in the posterior two-fifths of the segment. Last sternite twice as long as wide or nearly so (Fig. 1). Process of coxopleura on each side with 4 small spines forming a compact group at its apex. Porose area of coxopleura clearly defined, rounded distally and reaching exactly as far as the posterior margin of the last sternite. End-legs longer and more slender than in the typical form but with about the same number of small spines on the prefemur; these spines of very uniform size. Distal tarsal segment of end-legs sparsely covered with fine short hairs. Remaining characters corresponding with those of *Cormocephalus multispinus multispinus* Kraepelin.

Color. In alcohol yellow with a reddish tinge.

Size. Total length of body, 41 mm. This does not include the end-legs which are much contracted.

Otostigmus cuneiventris Porat

Otostigmus cuneiventris Porat, 1893, Bih. Svensk. Akad., **18**, p. 10.

1. Amani, 3000 feet, Usambara Mtns., T.T. xi.26.

Alipes grandidieri (Lucas)

Eucorybas grandidieri H. Lucas, 1864, Ann. Soc. ent. France (4), **4**, p. 420.

1. Ngatana, 300 feet, Tana River, K.C. vi.34.

1. Mangasini, 4000 feet, Usandawi, T.T. 13.xii.29.
38. Amani, 3000 feet, Usambara Mtns., T.T. xi.26.
1. Magrotto Mtn., 2500 feet, near Tanga, T.T. vii.39.
1. Siga Caves, 50 feet, near Tanga, T.T. vi.39.
1. Tanga, 50 feet, coast of T.T. 3.xi.29.
1. Morogoro, 1628 feet, T.T. 1.xi.16.
1. Nchingidi, 2700 feet, Rondo Plateau, T.T. v.39.

The collection includes a number of developmental stages; accompanying two Amani females are two batches of eggs and four post-natal development stages. If the batches, which number 70 and 103 respectively, represent two layings, then the number produced by this

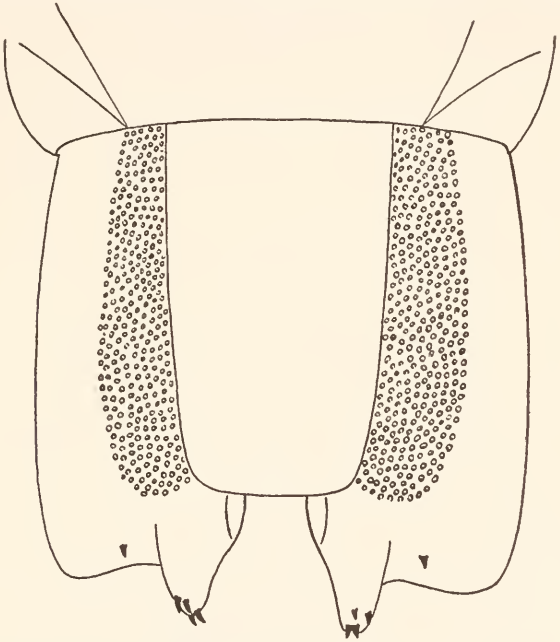

Fig. 1. *Cormocephalus multispinus quadridens* sp. nov. Sternite and coxopleurae of the last segment viewed from below.

species appears to be greater than is usual in the Scolopendromorpha. It is certainly more than the highest number (40) deposited by the somewhat smaller *Cormocephalus multispinus* in Southern Africa, and that (33) recorded for *Scolopendra dalmatica* in Europe.

The earliest development stage consists of 19 embryos and corresponds very closely with that described and figured as the first

embryonic stage of the Natal centipede *Cormocephalus multispinus* (Lawrence, 1947, Ann. Natal Mus., **11**, p. 142, text-figs. 1 A, A′).

The three further stages collected by Loveridge represent various periods of the adolescent phase in which the bodies of the young resemble the adults in miniature but are extended and not flexed in a horse-shoe, so that they are able to perform active movements.

Stage I of this phase is represented by a batch of 57 individuals. It is what Heymons calls "the foetal stage," and has been described for *Alipes multicostis* by Verhoeff (1925, in Bronn Klass. Ord. Tierreich, Chilopoda, **5**, (2), p. 182, pl. xiv, figs. 3–8) with whose description the specimens before me correspond fairly well. The adolescents are 21–23 mm. in body length, including the end-legs; the antennae have 17 entirely hairless segments, the ocelli invisible. Body segments with faint traces of the longitudinal keels only on the posterior tergites; stigmata rudimentary, with minute openings; mouthparts not chitinised, weak claws present on the legs but spines and spurs absent. End-legs unmodified, closely resembling Verhoeff's figure 3 (*loc. cit.*), the tibial and tarsal segments somewhat flattened and distinctly wider than the preceding ones.

Stage II of the adolescent phase is represented by a batch of 37 individuals whose bodies measure from 28–32 mm. in total length. In this stage, which is a marked advance on the previous one, all the structures found in the adult are present in miniature. The keels of the tergites, ocelli, tarsal and claw spurs are present as in the adult; antennae, except the two basal segments, with dense fine hairs; stigmata well developed, with chitinous peritremes, mouthparts well chitinised. The end-legs in this stage show all the modifications found in the adult forms, though much smaller.

Another batch of 8 individuals may represent a still further stage but in size and structure does not differ from the preceding. In colour, however, these are noticeably darker, being described by Loveridge as "violet-coloured brown," whereas specimens in the previous stage are only slightly pigmented. The largest adult female accompanying these juveniles measures 120 mm. in total length, the end-legs included.

Alipes multicostis intermedius Attems

Alipes multicostis intermedius Attems, 1911, Revue Suisse Zool., **19**, p. 272.

1. Mubango, 4000 feet, Mabira Forest, U. 10.xi.38.
15. Kibale Forest, 4000 feet, U. xii.38.
4. Idjwi Id., 6500 feet, Lake Kivu, B.C. ii.39.

Ethmostigmus trigonopodus (Leach)

Scolopendra trigonopodus Leach, 1817, Zool. Misc., **3**, p. 36.

9. Lamu, 50 feet, Lamu Island, K.C. v.34.
1. Mombosasa, 100 feet, near Witu, K.C. v.34.
1. Gongoni, 50 feet, coast of K.C. 27.vi.34.
2. Kilindini, 50 feet, Mombasa Id., K.C. 25.vii.39.
2. Tsavo, 1525 feet, Tsavo River, K.C. 6.iv.34.
9. Voi, 1833 feet, Coast Province, K.C. iv.34.
3. Mbuyuni, 3500 feet, K.C. 13.v.16.
3. Moshi, 2700 feet, T.T. iii.16.
1. Longido Mtn. west foot, 2000 ft., T.T. 1.ii.16.
3. Mangasini, 4000 feet, Usandawi, T.T. 13.xii.29.
1. Kikuyu, 3900 feet, Dodoma, T.T. 21.xii.29.
1. Madarazi, Uluguru Mtns., T.T. 22.x.26.
5. Morogoro, 1628 feet, T.T. i–v.17 & 7.ii.18.
2. Siga Caves, 50 feet, near Tanga, T.T. vi.39.
12. Dar es Salaam, 42 feet, T.T. 6–9.xi.26.
8. Mbanja, 400 feet, near Lindi, T.T. iv.39.
2. Mikindani, 20 feet, coast of T.T. 23.iii.39.
1. Tanganyika Territory without further data.
3. Kausi Village, 1400 feet, Lake Malombe, N. 25.ii.49.

Rhysida nuda togoensis Kraepelin

Rhysida togoensis Kraepelin, 1903, Mitt. Mus. Hamburg, **20**, p. 145, figs. 84–85.

14. Ngatana, 300 feet, Tana River, K.C. vi.34.

Rhysida stuhlmanni Kraepelin

Rhysida stuhlmanni Kraepelin, 1903, Mitt. Mus. Hamburg, **20**, p. 152, fig. 97.

1. Morogoro, 1628 feet, T.T. 1.ii.18.
3. Kitaya, 300 feet, Ruvuma River, T.T. iii.39.
1. Ruo River, 3000 feet, Mlanje Mtn., N. 4.iv.49.

Rhysida intermedia Attems

Rhysida intermedia Attems, 1910, in Voeltzkow, Reise in Ostafrika, **3**, p. 83.

2. Lutindi Mtn., 4000 feet, Usambara Mtns., T.T. 12.xii.26.
1. Nyange, 2500 feet, Uluguru Mtns., T.T. 11.x.26.
4. Vituri, 2000 feet, Uluguru Mtns., T.T. 30.x.26.

RHYSIDA AFRA AFRA (Peters)

Ptychotrema atrum Peters, 1855, Monatsber. Akad. Wiss. Berlin, p. 82.

2. Amani, 3000 feet, Usambara Mtns., T.T. xi.26.

CRYPTOPS LOVERIDGEI sp. nov.

Figure 2

Type. M.C.Z. Holotype from Mbanja, 400 feet, near Lindi, Tanganyika Territory; collected by Arthur Loveridge, April, 1939.

Paratypes. Three further specimens with the same data as the type.

Diagnosis. This species agrees in all particulars with *C. aloysii sabaudiae* Silv. except in the structure of the porose area and the dentition of the end-legs.

Description. Resembling *C. aloysii sabaudiae* in the characters of the body segments and head; sternites fairly thickly and regularly covered

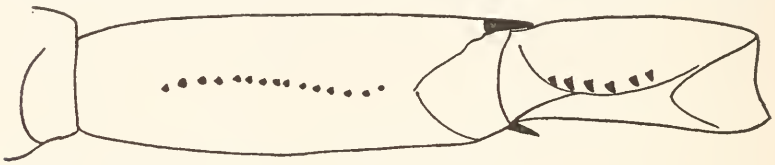

Fig. 2. *Cryptops loveridgei* sp. nov. Tibia and first tarsus of the end-leg viewed from below.

with minute granules, more so in the posterior ones, giving them a shagreened appearance. Porose area thickly covered with numerous pores, reaching well beyond the posterior margin of the last sternite; the posterior border of the coxopleura with a few spines. Prefemur of end-legs with numerous black spine-like hairs below and at the sides, femur with similar but fewer spines; prefemur with a medial apical tooth, femur with a lateral apical tooth, tibia with an apical tooth both laterally and medially, all these very distinct. Tibia with a row of 12–14 minute serrate denticles below, arranged in a slightly sigmoid curve, first tarsus with 5–6 serrate teeth distinctly larger than those of the tibia (Fig. 2).

Color. Reddish yellow to reddish brown.

Size. Body length of largest specimen 50 mm., of smallest 42 mm. Width of largest specimen 2.5 mm.

Remarks. This is an unusually large species. The specimens on which Silvestri's description of *C. aloysii sabaudiae* was based seem to have been unusually small (12 mm. in length), even for a species of *Cryptops*, and may have been immature. The fact that the specimens

described above agree remarkably well with Silvestri's species, except in the characters of the porose area and end-legs, point to the possibility of their being the same species of which the types of *C. aloysii sabaudiae* are immature forms.

Cryptops kivuensis sp. nov.

Type. M.C.Z. A single specimen from Idjwi Island, 6500 feet, Lake Kivu, Belgian Congo; collected by Arthur Loveridge, February, 1939.

Diagnosis. This species agrees most closely with *C. stupendus* Attems, but differs in the dentition of the end-legs and other characters.

Description. Headplate with very faint longitudinal furrows in its posterior two-fifths. Anterior margin of coxa of toxicognaths with 3 or 4 long bristles. Complete longitudinal furrows from the fourth or fifth tergite onwards, lateral furrows from about the fifth tergite. Last tergite forming a fairly sharp angle in the middle posteriorly. Sternites with cross furrows, the longitudinal ones definitely longer than the transverse ones. Legs well provided with strong setae, those on the thirteenth pair to the end-legs strong and spine-like, especially on the prefemur and femur, where they form irregular rows. Prefemur of end-legs with an apical dorso-medial spine, femur with a dorso-lateral spine, tibia with small apical spines on both sides. Tibia below with a sinuous row of about 13 denticles, tarsus with 5 larger saw-like teeth, decreasing progressively in size distally.

Size. Total length about 33 mm.

Suborder GEOPHILOMORPHA

Mecistocephalus insularis (Lucas)

Geophilus insularis H. Lucas, 1863, in Maillard, Note Réunion, ed. 2, pl. xxi. fig. 1.

3. Amaler River, 5000 feet, Debasien Mtn., U. xi.33.
1. Entebbe, 3800 feet, Lake Victoria, U. 28.vi.30.
2. Mubuku Valley, 6800 feet, Ruwenzori Mtns., U. 31.xii.38.
1. Ngatana, 300 feet, Tana River, K.C. vi.34.
1. Lutindi Mtn., 4000 feet, Usambara Mtns., T.T. 13.xii.26.
1. Amani, 3000 feet, Usambara Mtns., T.T. xi.26.
2. Kilosa, 1640 feet, Usagara, T.T. 31.i.21.
1. Kibakwe, Ugogo, T.T. 10.ii.23.
1. Mukwese, Manyoni, T.T. 5.vii.26.

2. Matipa Ridge, 6000 feet, Misuku Mtns., N. 27.ix.48.
2. Nyika Plateau, 7000 feet, N. xi.48.
2. Nchisi Mtn., 5000 feet, N. xii.48.

Orphnaeus validus sp. nov.
Figure 3.

Cotypes. M.C.Z. Three specimens from Kibakwe, Ugogo, Tanganyika Territory; collected by Arthur Loveridge, February 10, 1923.

2. Voi, 1833 feet, K.C. 10.iv.34.
3. Longido Mtn. west foot, 1628 feet, T.T. 1.ii.16.
1. Mangasini, 4000 feet, Usandawi, T.T. 14.xii.29.

Diagnosis. The material which can be allocated to this species comes from four localities and agrees in the following characters. Tarsus of end-legs 7-jointed, the last segment without claw. Stigma pleurite and presecutellum distinctly separated by a deep suture. First maxilla as in figure 3B, claw of second maxilla fringed with stout blunt spines along its ventral edge as in figure 3A. One to three rows of paratergites (see below under "*Remarks*"). Gonopods two-jointed. Mandibles with 4 or 5 dentate lamellae carrying 8-13 teeth. No frontal suture (Stirnfurche) on the headplate anteriorly. Antennae short, reaching to about the base of the toxicognaths. The form differs from any other species of *Orphnaeus* at least in its far greater size, and except in the case of *O. mexicanus*, in the larger number of legs.

Description. Headplate distinctly wider than long, slightly produced in the middle anteriorly, forming a blunt and very wide angle; almost smooth, with a few minute well separated pits. Antennae short, not reaching the posterior margin of the first leg-bearing segment, the joints smooth and shiny but from the sixth onwards with very fine short hairs.

Tergites without hairs, from the fifteenth backwards with minute leather-like corrugations and asperities laterally to the median impression, but the lateral margin of each tergite smooth and shiny; the median impressions very strong, especially in the middle and posterior half of the body, the middle furrow much narrower and shallower than the lateral ones but still very distinct. Sternites smooth and shiny, in some specimens (? a sexual character) with a median longitudinal furrow in the posterior segments, sternite of end-legs twice as wide as long, its posterior margin straight.

Pores of the anterior sternites arranged in two groups, that along

the posterior margin much stronger than the anterior group and extending right across the segment or almost so; the anterior group much smaller, occupying a lens-shaped area in the middle of the sternite, thinning out on each side and not reaching the sides; in the

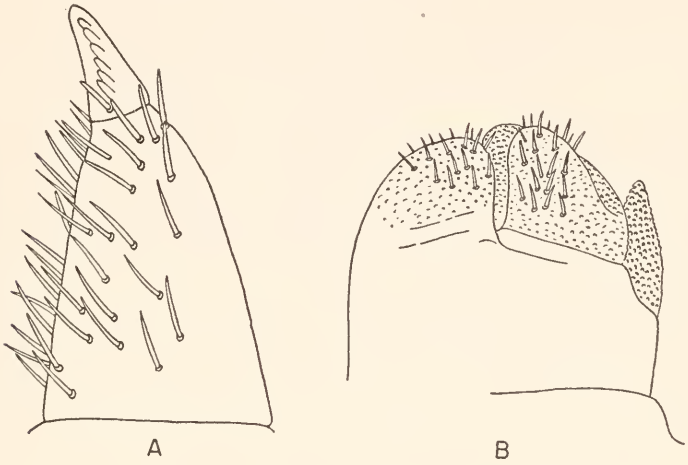

Fig. 3. *Orphnaeus validus* sp. nov. *A*, second maxilla, terminal segment and claw of the telepodite; *B*, left half of first maxilla.

eightieth sternite both groups are divided, the anterior ones being very small, the posterior ones composed of numerous pores in a large oval area clearly separated by a smooth gap; they continue this way to the end of the body, the posterior areas becoming smaller and approaching each other again posteriorly, the anterior ones almost evanescent.

Color. Body yellow, headplate, toxicognaths and anterior segments slightly more reddish but not contrasting with the remaining segments; the median impressions from about the fortieth tergite giving the impression of a narrow darker band with a greenish tinge, continued to the posterior end of the body.

Size. The measurements, which are approximate but probably conservative, of the nine specimens are given together with the number of pairs of legs in the following table.

Localities roughly S. to N.	*Total length*	*Number of legs*
Kibakwe	135 mm.	127 pairs
"	118 "	124 "
"	110 "	125 "
Longido	95 "	115 "
"	88 "	106 "
"	87 "	117 "
Mangasini	117 "	127 "
Voi	88 "	127 "
"	74 "	114 "

Remarks. The characterisation of the genera of the family Oryidae seems to rest upon insecure foundations in at least one respect, the number of rows of paratergites. In the types from Kibakwe one specimen had none, in the two others from the same tube one had three distinct rows in the middle of the body, the other had none anteriorly, one in the middle and two in the posterior part of the body.

In the two specimens from Longido Mountain, one had three rows of paratergites, the other only one; in the example from Mangasini there is one row on most segments but occasionally two; in the specimens from Voi one had three rows, the other one or two rows. The number of rows of paratergites visible seems to depend on the condition of the specimen; all those that were well distended had three rows; in flattened or somewhat shrunken examples the rows are fewer in proportion to the amount of shrinkage.

All the specimens listed above are either larger or have more pairs of legs than either *O. brevilabiatus* or *O. meruinus* recorded from tropical East Africa, while the arrangement of its pores seems to indicate that *validus* is more closely related to *meruinus* than to *brevilabiatus*.

Habits. On the label accompanying the Mangasini cotype, Loveridge notes that it is a luminescent form. Verhoeff (1925, in Bronn, Klass. Ord. Tierreich, Chilopoda, **5**, (2), p. 310) lists *O. brevilabiatus* as the only African geophilid known to possess light-producing capacities. It appears probable all the species of this widespread genus, being well provided with ventral pores, are light-producing forms.

Material specifically undeterminable

The undermentioned geophilids are probably referable to *Orphnaeus*, but are now too old to be specifically identifiable.

2. Morogoro, 1628 feet, T.T. 1.x.17 & 4.ii.18.
1. Mpwapwa, 3315 feet, Ugogo, T.T. 23.xi.29.

While the following scolopendrids are represented by immature forms, or have lost essential diagnostic structures.

Cormocephalus

1. Nyamkolo, 2700 feet, Lake Tanganyika, N.R. 7.v.30.

Otostigmus

1. Mpwapwa, 3315 feet, Ugogo, T.T. 23.xi.29.

Alipes

1. Entebbe, 3800 feet, Lake Victoria, U. 27.vi.30.

Rhysida

1. Magrotto Mtn., 2500 feet, near Tanga, T.T. vii.39.
1. Vituri, 1628 feet, Uluguru Mtns., T.T. 30.x.26.

Cryptops

2. Amaler River, 5000 feet, Debasien Mtn., U. xi.33.
1. Ngatana, 300 feet, Tana River, K.C. vi.33.
1. Kausi Village, 1400 feet, Lake Malombe, N. 25.ii.49.

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VI

DECAPOD CRUSTACEA

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U. S. National Museum

CAMBRIDGE, MASS., U. S. A.
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VI

Decapod Crustacea[1]

By Fenner A. Chace, Jr.

U. S. National Museum

As might be expected of the first extensive collection of fresh-water crabs to be recorded from the highlands of Nyasaland, at least two of the five species collected by Mr. A. Loveridge apparently were previously undescribed. One of the remaining three forms is the rather striking *Potamon* (*Potamonautes*) *orbitospinus* Cunnington from Lake Nyasa. Another is a species which is tentatively identified as *P.* (*P.*) *hilgendorfi* (Pfeffer), previously recorded from various localities in Kenya Colony, Uganda, and Tanganyika Territory. The last species, which may be a third undescribed form, is represented by a single immature female. A list of the African fresh-water crabs is given in Chace, 1942.

Several authors have expressed regret at the tendency to propose new names for African potamonids on insufficient evidence and have suggested that the total number of species is likely to be considerably reduced when the variations of the valid forms can be correctly evaluated. There is certainly little excuse for describing as new a single immature or incomplete specimen, but to assign a specific name to material from an area far removed from the known range of that particular species, merely because the apparent differences are slight and may eventually be accounted for by normal variation, seems equally blameworthy. It is probable that the potamonid fauna of Africa, like other similar faunas, is made up of a few variable species with extensive ranges and a larger number of more or less isolated forms distinguishable by constant though relatively minor characters. The true picture will become clear only when good series of specimens of different ages, like those collected by Mr. Loveridge, become available from many localities throughout the African continent. It is usually a simple matter to synonymize names accompanied by adequate descriptions, once the limits of variation are determined, whereas it may be far more difficult to decide whether or not a lot of specimens assigned to a previously described species, with few or no comments, was correctly identified.

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A few marine decapods collected by Mr. Loveridge at Port Sudan, Anglo-Egyptian Sudan; Dar es Salaam, Tanganyika Territory; and Beira, Mozambique, are included in this report for the locality records.

PAGURIDAE

Calcinus laevimanus (Randall)

Pagurus tibicen Milne Edwards, H., 1837, p. 229. Not *Cancer tibicen* Herbst, 1791.
Pagurus laevimanus Randall, 1840, p. 135.
Calcinus tibicen Dana, 1852, p. 457.
Calcinus herbstii de Man, 1888, p. 437.
Calcinus herbstii Alcock, 1905, p. 53, pl. 5, fig. 4.
Calcinus laevimanus Rathbun, in Stimpson, 1907, p. 208 (footnote).

1 specimen (M.C.Z. 12600). Dar es Salaam, Tanganyika Territory. 13. vii. 48.

The name of this common hermit crab has caused considerable difference of opinion. Most recent authors have followed Alcock's example in accepting de Man's name. The latter was based on the contention that Randall's description does not fit the species in question inasmuch as it refers to the *right* hand as being very large. It seems obvious, however, that this was an error in the description, for no other Hawaiian pagurid fits Randall's species. Comparison of East African and Hawaiian material leaves little doubt that the same form is involved in both localities, and I therefore prefer to accept Miss Rathbun's decision regarding the valid name.

COENOBITIDAE

Coenobita rugosus H. Milne Edwards

3 ovigerous ♀ ♀ (M.C.Z. 12601; U.S.N.M. 91157). Port Sudan, Anglo-Egyptian Sudan. 23. vi. 48.

CALAPPIDAE

Matuta lunaris (Forskål)

Cancer lunaris Forskål, 1775, p. 91.
Matuta victor Alcock, 1896, p. 160.
Matuta lunaris Stebbing, 1905, p. 54.
Matuta lunaris Ihle, 1918, p. 185.

1 ♀ (M.C.Z. 12602). Beira, Mozambique; mangrove swamp. 17. vii. 48.

PORTUNIDAE

Portunus (Portunus) pelagicus (Linnaeus)

Cancer pelagicus Linnaeus, 1758, p. 626.
Neptunus pelagicus Alcock, 1899, p. 34 (part).

1 ♂ 1 ovig. ♀ (M.C.Z. 12603). Dar es Salaam, Tanganyika Territory. 12. vii. 48.

POTAMONIDAE

Potamon (Potamonautes) orbitospinus Cunnington

Potamon (Potamonautes) orbitospinus Cunnington, 1907, p. 259, pl. 16, fig. 1.
Potamonautes orbitospinus Balss, 1936, p. 182, text-fig. 18.

1 ♀ (M.C.Z. 12604). Mtimbuka, 13 miles north of Fort Johnston, on southwest shore of Lake Nyasa, Nyasaland. ii. 49.

Potamon (Potamonautes) hilgendorfi (Pfeffer)

Telphusa hilgendorfi Pfeffer, 1889, p. 32.
Potamon (Potamonautes) hilgendorfi Chace, 1942, p. 186.

26 ♂♂ 20 ♀♀ 4 juv. (M.C.Z. 12605; U.S.N.M. 91156). Matipa Forest, Misuku Mountains, Nyasaland. 1–16. x. 48.
1 ♂ 2 ♀♀ (M.C.Z. 12606). Nchisi Mountain, Nyasaland. 1–11. xii. 48.

The identity of these specimens with Pfeffer's species is by no means certain. Most of them are obviously immature; the only female with an abdomen nearly as broad as in the adult is one with a carapace breadth of 47.5 mm. from Nchisi Mountain. The largest male, from the same locality is only 37.5 mm. broad. The specimens agree reasonably well with two immature males received from the Hamburg Museum (Rathbun, 1933, p. 256); the only noticeable difference is that the penultimate abdominal segment in the males from the present collection is slightly shorter and broader than it is in those received from Hamburg. Whether or not this difference is significant or whether it represents merely a local variation can be determined only when additional adult specimens become available for study.

Potamon (Potamonautes) cholоënsis, sp. nov.

Text-figures 1 and 2

Type ♂ (M.C.Z. 12607). Cholo Mountain, Cholo District, Nyasa-

land. 9–26. iii. 49.
21 ♂♂ 28 ♀♀ (M.C.Z. 12608; U.S.N.M. 91158). Same data.
1 ovig. ♀ (M.C.Z. 12609). Zomba Plateau, Nyasaland. 2. xii. 48.

Carapace seven-tenths as long as broad, convex anteriorly, rather deeply areolated but nearly flat behind protogastric region. Branchial regions swollen laterally, extending beyond outer orbital angle by more than width of orbit in adults. Surface appearing smooth and polished to the naked eye, punctate and very finely granulate under a lens, with some larger granules between outer orbital angle and end of post-frontal crest; faint rugae extend inward from lateral margins. Post-frontal crest granulous, rather sharp, and not interrupted, but disappearing just before reaching lateral margins. H-shaped depression very deep. Cervical groove absent except for a short, faint extension of the H-shaped depression. Depression dividing posterior branchial region into two parts broad and shallow, but distinct. Front obscurely bilobate in dorsal view, slightly and nearly regularly convex in frontal view. Granulated frontal margin barely visible from above. Upper margin of orbit bulging slightly outward and nearly transverse. Outer orbital angle slightly broader than a right angle. Epibranchial tooth small and placed well behind end of post-frontal crest. Antero-lateral line faint behind epibranchial tooth and curving inward; branchial regions bulging beyond it at widest part of carapace in adult males.

Chelipeds very unequal, fingers gaping, widely so in major chela of adult specimens. Merus with a row of denticles and one large tooth on anterior margin. Carpus with two sharp teeth, the anterior the larger. Walking legs moderately long; the second one on the left side of the holotype is regenerating, but in the paratypes this leg is approximately twice as long as the carapace.

Abdomen of male with sixth somite less than half as long as basal width. Terminal somite about two-thirds as long as basal width and noticeably constricted laterally. Extremities of first abdominal appendages of male turned obliquely outward. Anterior transverse sternal groove well marked and deep but becoming abruptly narrower and shallower at lateral margins of sternum. Posterior groove deep laterally, indistinct but continuous medially.

Outer maxillipeds smooth and punctate, without an ischial groove; exopod provided with a well developed, setose palp. Mandibular palp two-jointed, the terminal joint simple.

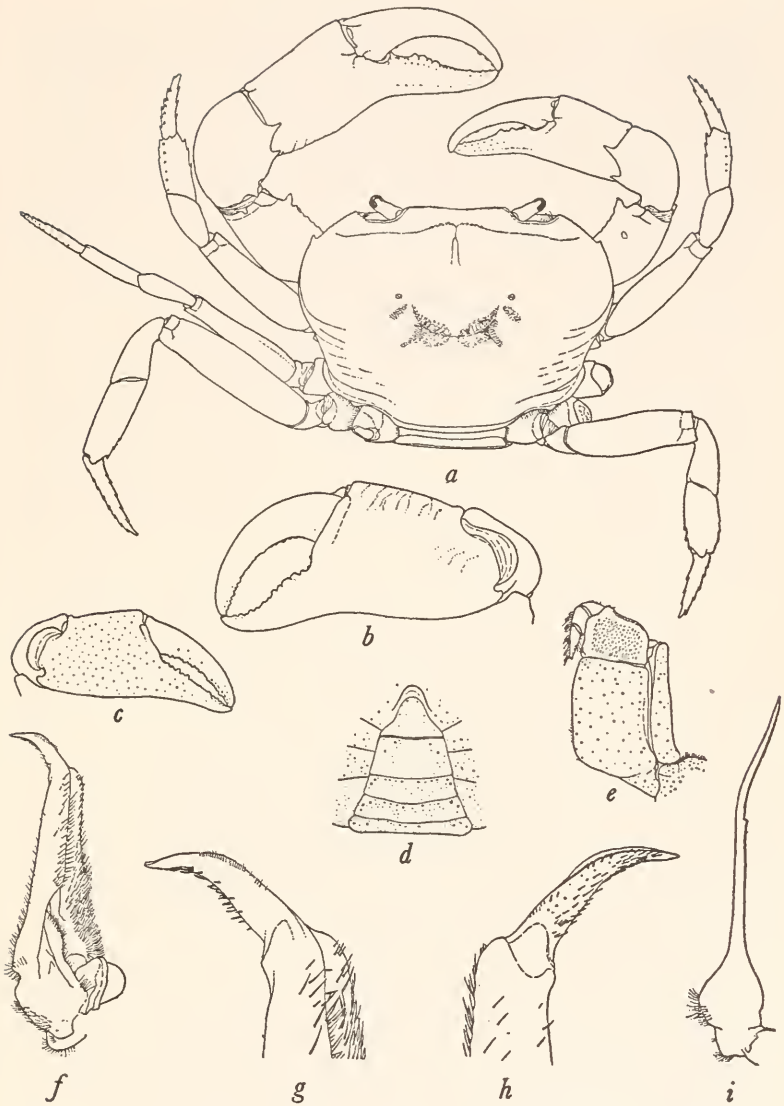

Fig. 1. *Potamon* (*Potamonautes*) *choloënsis*, male holotype; *a*, dorsal view, x 1; *b*, major chela, x 1; *c*, minor chela, x 1; *d*, abdomen, x 1; *e*, outer maxilliped, x 2; *f*, posterior view of first right abdominal appendage, x 4; *g*, postero-median view of tip of same, x 10; *h*, anterolateral view of tip of same, x 10; *i*, posterior view of second right abdominal appendage, x 4.

Measurements. Male holotype, length of carapace 29.8 mm., breadth 41.6 mm., distance between outer orbital angles 26.9 mm., breadth of front measured between inner suborbital angles 13.3 mm. Measurements for all of the intact specimens are shown in figure 2; females with a carapace length of more than 20 mm. usually have the carapace slightly narrower than males of the same size because of the less swollen branchial regions in females, but there were no other significant sexual differences.

As usual in this genus, there is some variation with sex and age. In large males, as noted above, the branchial regions extend laterally beyond the lateral line at the widest part of the carapace; this is not true of females. Most of the increased proportionate width in large specimens is due to lateral expansion beyond the orbits; in males with a carapace length of less than 22 mm., and in slightly larger females, the lateral expansion beyond the orbits is less than the orbital width. In young specimens the carapace is much flatter than in adults and the lateral line and branchial rugae are much more pronounced. Only in males with a carapace length of more than 26 mm. are the fingers of the major chela as widely gaping as in the type. In smaller males and in adult females, the movable finger is not markedly arched, and in specimens with a carapace length of less than 14 mm. the chelae are nearly subequal and the fingers meet throughout most of their length. Males with a carapace length of about 14 mm. have the first abdominal appendages somewhat reduced and the tips straighter than in adults; in still smaller specimens these appendages are much reduced and quite straight. The smallest male has a carapace length of 9.8 mm; the first pleopods are very rudimentary in this specimen. In females with a carapace length of more than 23 mm. the abdomen is fully developed; it is somewhat narrower, but still rounded, in specimens with carapace lengths of 21 to 23 mm.; but at a carapace length of 20 mm. or less the abdomen has the juvenile subtriangular form.

From the species which seem to be most closely allied to it, *P. choloënsis* may be distinguished as follows. It is a larger species than *P. ballayi* (A. Milne Edwards, 1886) from the Congo and has the carapace less convex anteroposteriorly, the second tooth on the carpus of the chelipeds larger, and the first abdominal appendages of the male very different. It is somewhat smaller than *P. bayonianus* (Capello, 1864) from Angola, has a less prominent epibranchial tooth, and 2 sharp teeth rather than a tooth and a lobe on the carpus of the chelipeds. From *P. biballensis* Rathbun, 1905, from Angola it differs in

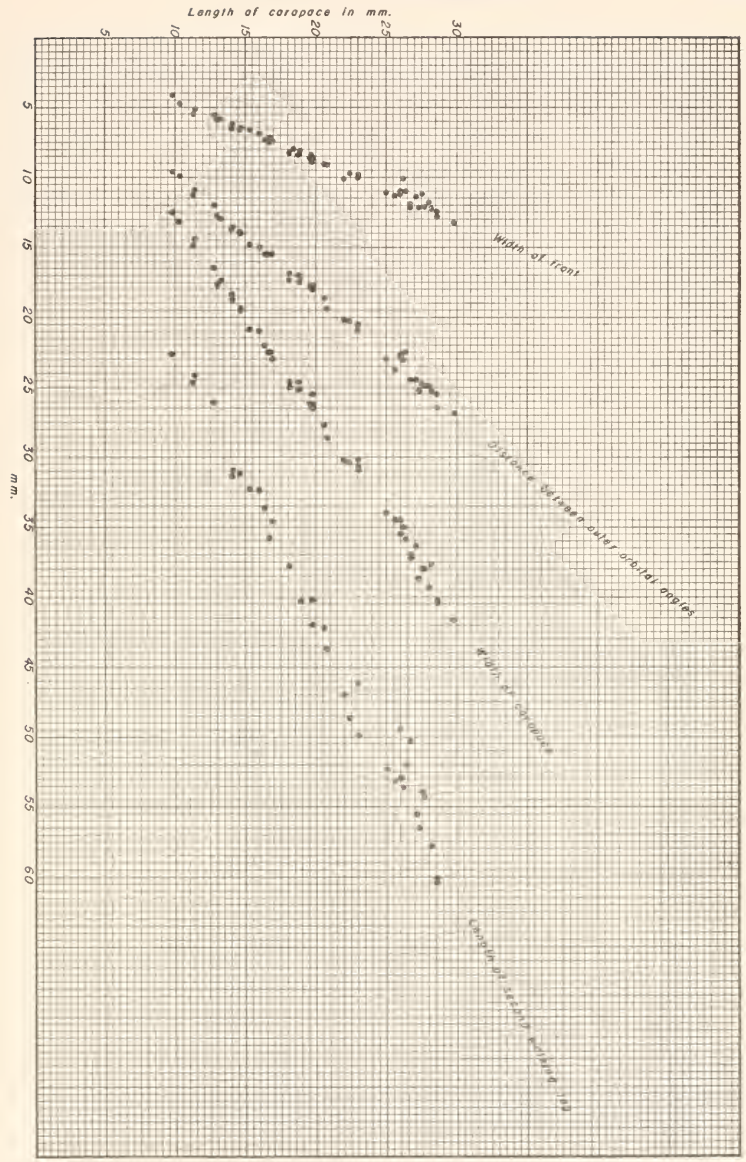

Fig. 2. Variation with growth in *Potamon* (*Potamonautes*) *cholœnsis*.

having the post-frontal crest less straight and the epibranchial tooth not reaching nearly to the level of the orbit. It is distinguished from *P. bombetokensis* Rathbun, 1904, from Madagascar by the less convex carapace, obtuse outer orbital tooth, less advanced epibranchial tooth, and the shorter and broader sixth abdominal somite of the male. From *P. bottegoi* de Man, 1898, it differs in the much less convex carapace, obtuse outer orbital angle, and much more constricted terminal abdominal somite in the male. From *P. calcaratum* Gordon, 1929, from the Lower Zambezi Valley, Mozambique, it differs in having the carapace less convex and more swollen laterally, the outer orbital angle obtuse, the chelipeds and legs more slender, the last abdominal somite of the male constricted, and the male abdominal appendages very different. The more obtuse outer orbital angles, the less advanced epibranchial tooth, and the much more expanded branchial regions distinguish it from *P. capelloanus* Rathbun, 1905, from Angola. It has the outer orbital and epibranchial teeth less prominent and less acute and the frontal margin less deeply bilobate than has *P. dubius* (Capello, 1873) from Angola. *P. choloënsis* appears to correspond closely with the description of *P. dubius jallae* (Nobili, 1896) from northern Rhodesia, but comparison with a cotype of that species in the collections of the U. S. National Museum discloses that the carapace of *P. choloënsis* is broader and more depressed centrally, the outer orbital angle is not acute, the epibranchial tooth is smaller, and the sixth abdominal somite of the male much broader. It has the branchial regions more swollen and the epibranchial tooth set farther back than in *P. dybowskii* Rathbun, 1904, from French Equatorial Africa. It differs from *P. ecorssei* Marchand, 1902, in having the branchial regions expanded farther laterally and in having the sixth abdominal somite of the male somewhat broader.

Potamon (Potamonautes), sp. ?

1 ♀ (M.C.Z. 12610). Nyika Plateau above Nchenachena, Nyasaland. 8. xi. 48.

This single specimen has the carapace 18.4 mm. long and 25.0 mm. broad, the distance between the outer orbital angles 16.5 mm., the front between the inner suborbital angles 7.3 mm. broad, and the second walking leg 38.4 mm. long, measured from the coxal articulation with the sternum. It appears to be a slightly smaller species than *P. hilgendorfi* (Pfeffer, 1889), for the abdomen is narrowly oval rather

than subtriangular as in females of *P. hilgendorfi* of similar size. It also differs from that species in having the post-frontal crest turned backward and narrowly interrupted just before reaching the lateral margin, in having the front and the distance between the outer orbital angles shorter, and the outer orbital angles slightly less than rectangular, rather than obtuse as in *P. hilgendorfi*. The slope of the outer ends of the post-frontal crest suggests a relationship with *P. platynotus* Cunnington, 1907, from Lake Tanganyika, but the present specimen does not have the spooned fingers characteristic of that species.

Potamon (Potamonautes) montivagus, sp. nov.

Text-figures 3 and 4

Type ♂ (M.C.Z. 12611). Cholo Mountain, Cholo District, Nyasaland. 9–26. iii. 49.

6 ♂♂ 6 ♀♀ 1 juv. (M.C.Z. 12612; U.S.N.M. 91160). Same data.

1 yng. ♂ 1 yng. ♀ (M.C.Z. 12613). Likabula River, Mlanje Mountain, Nyasaland. 27–31. vii. 48.

10 ♂♂ 6 ♀♀ 1 juv. (M.C.Z. 12614). Ruo River, Mlanje Mountain, Nyasaland. 1–9. iv. 49.

12 ♂♂ 15 ♀♀ 7 juv. (M.C.Z. 12615; U.S.N.M. 91159). Chiradzulu Mountain, near Blantyre, Nyasaland. 25–31. viii. 48.

1 ♂ 1 ♀ (M.C.Z. 12616). Zomba Plateau, Nyasaland. 2. ix. 48.

1 ovig. ♀ (M.C.Z. 12617). Dedza, at base of Dedza Mountain, Nyasaland. 21. xii. 48.

6 ♂♂ 7 ♀♀ (M.C.Z. 12618; U.S.N.M. 91155). Nchisi Mountain, Nyasaland. 1–11. xii. 48.

1 ovig. ♀ (M.C.Z. 12619). Chitala River, near Salima, Nyasaland. 14. xii. 48.

1 ovig. ♀ (M.C.Z. 12620). Nchenachena, northern Nyasaland. 23. x. 48.

Carapace slightly more than two-thirds as long as broad in adults, convex in both directions on anterior portion, flatter posteriorly. Branchial regions usually swollen laterally beyond outer orbital angles by more than width of orbits in adults. Surface punctate to the naked eye and faintly striate anterolaterally. Post-frontal crest rather sharp and high, continuous from midline to lateral margins, faintly granulous medially becoming more distinctly so laterally; it is concave forward throughout its length, except for a slight convexity behind the retracted cornea, and is situated rather far forward, nearly attaining the

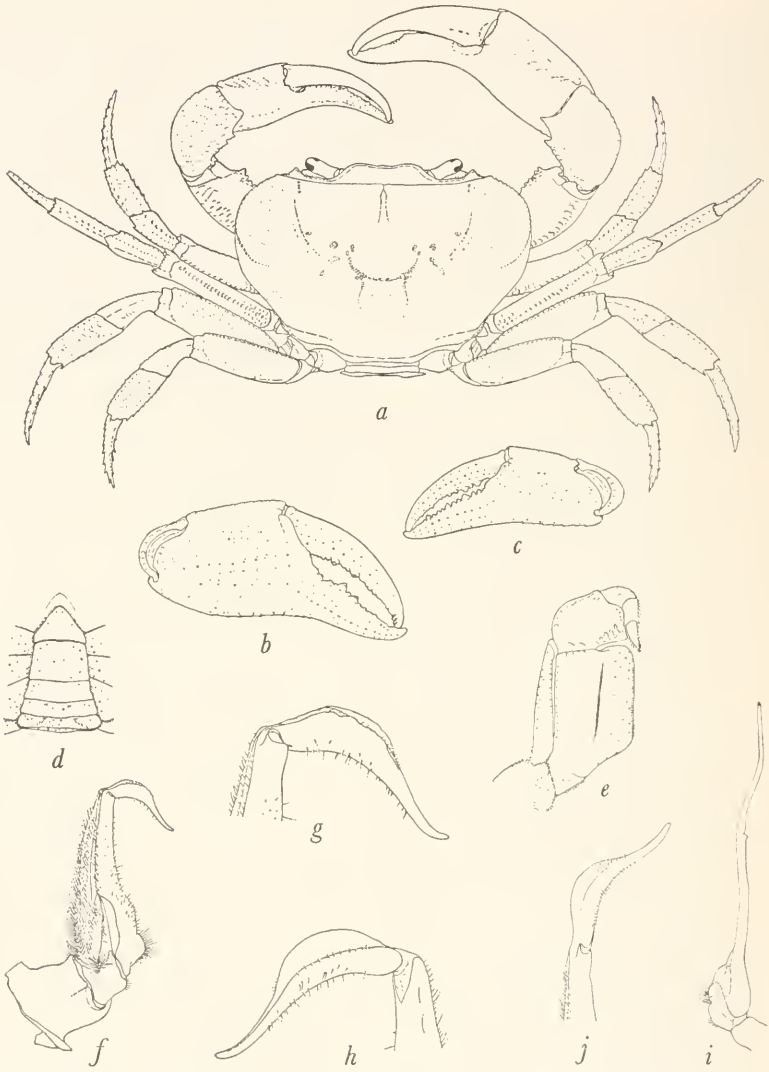

Fig. 3. *Potamon* (*Potamonautes*) *montivagus; a*, dorsal view of male holotype x 0.6; *b*, major chela of holotype, x 0.6; *c*, minor chela of holotype, x 0.6; *d*, abdomen of holotype, x 0.6; *e*, outer maxilliped of holotype, x 1.5; *f*, posterior view of first left abdominal appendage of holotype, x 2.0; *g*, posterior view of tip of same, x 5.0; *h*, anterior view of tip of same, x 5.0; *i*, posterior view of second right abdominal appendage of holotype, x 2.0; *j*, posterior view of distal end of first left abdominal appendage of male paratype with a carapace length of 27.5 mm., x 5.0.

level of the orbital margins in dorsal view. There is a depression followed by a slight swelling in the deep groove in front of the crest just beyond the tip of the retracted eye. H-shaped depression well-marked. Cervical groove faintly perceptible anteriorly where it meets the post-frontal crest behind the outer orbital angles. Depression dividing the posterior branchial region broad and indistinct. Front obscurely trilobate in dorsal view, regularly convex in frontal view. Frontal margin typically visible from above. Upper margin of orbit nearly straight and trending obliquely forward. Outer orbital angle subrectangular. There is a broadly obtuse angle formed where the anterolateral margin turns outward toward the end of the post-frontal crest. No epibranchial tooth. Anterolateral line made up of granules and becoming very faint posteriorly as it curves inward onto the branchial region; the side wall of the latter extends noticeably beyond the lateral line at the widest part of the carapace in adult males, much less so in females.

Chelipeds unequal, fingers gaping moderately in major chela, very slightly in minor one. Merus with a row of tubercles, one of them dentiform, on anterior margin. Carpus with two sharp teeth, the anterior the larger. Walking legs rather long, the second, measured from the coxal articulation with the sternum, typically about twice as long as carapace.

Abdomen of male with sixth somite a little more than two-thirds as long as its basal width, the lateral margins slightly concave proximally. Terminal somite about two-thirds as long as broad, its proximal margin slightly longer than opposing margin of sixth somite. Anterior transverse sternal groove very deep. Posterior groove very deep laterally, indistinct medially, in very large specimens, indistinct throughout in smaller ones.

Outer maxillipeds with a deep ischial groove placed nearer inner than outer margin. Exopod provided with a small palp. Mandibular palp two-jointed, the terminal joint simple and hidden behind the mandible.

Measurements. Male holotype, length of carapace 43.8 mm., breadth 65.3 mm., distance between outer orbital angles 38.6 mm., breadth of front measured between suborbital angles 17.1 mm., length of second walking leg 85.1 mm. Comparable measurements for all of the intact specimens examined are shown in figure 4; no significant differences between the proportions of males and females could be found.

As usual in this family, there is considerable variation with size. In

young specimens the anterolateral marginal line on the carapace is much more prominent, causing the carapace to appear less convex; the anterolateral regions are also considerably more rugose. It can be determined from figure 4 that only in specimens with a carapace length of more than about 35 mm. do the branchial regions extend laterally beyond the outer orbital angles by more than the width of the orbit. In very small specimens there is no trace of the low median lobe on the frontal margin, and the front therefore appears bilobate rather than trilobate in dorsal view. Only in the holotype, the largest specimen in the collection, are the ends of the first pleopods of the male turned outward at an angle of 90° or more; the ends are more or less oblique in males with carapace lengths from 22 to 40 mm., nearly straight from about 15 to 21 mm., somewhat convergent from about 12 to 15 mm., and short and straight between 10 and 12 mm. The smallest recognizable male has a carapace length of 9.4 mm. and has the first pleopods barely discernible. The abdomen in females is fully developed only in specimens with a carapace length of more than 30 mm., narrowly oval between 20 and 30 mm., and triangular in smaller specimens. The three ovigerous specimens (none of them typical) have carapace lengths of 30.4, 35.8, and 37.9 mm.

The specimens from Dedza, Nchenachena, Nchisi Mountain, and the Chitala River are somewhat aberrant. The single dried ovigerous female from Dedza has the mesogastric groove hardly tectiform and the post-frontal crest distinctly convex forward so that it partially hides the orbital margin in dorsal view. The ovigerous female from Nchenachena, the lot of six males and seven females from Nchisi Mountain, and the ovigerous female from the Chitala River have the post-frontal crest typical, but the mesogastric groove is gradually divergent posteriorly rather than tectiform, the branchial regions more inflated, the frontal margin invisible in dorsal view, and the walking legs shorter, the second leg being little more than one and three-fourths as long as the carapace rather than about twice as long, as in the typical form. These specimens are indicated by open circles in figure 4. Although some of these specimens have a different appearance from the typical ones, it does not seem advisable to designate them as a distinct subspecies at this time.

There can be no assurance that this form is specifically distinct from all previously described species, but it appears to be distinguishable from the following species which seem to be most closely allied to it. It differs from *P. ambiguus* Rathbun, 1904, from Mount Kilimanjaro,

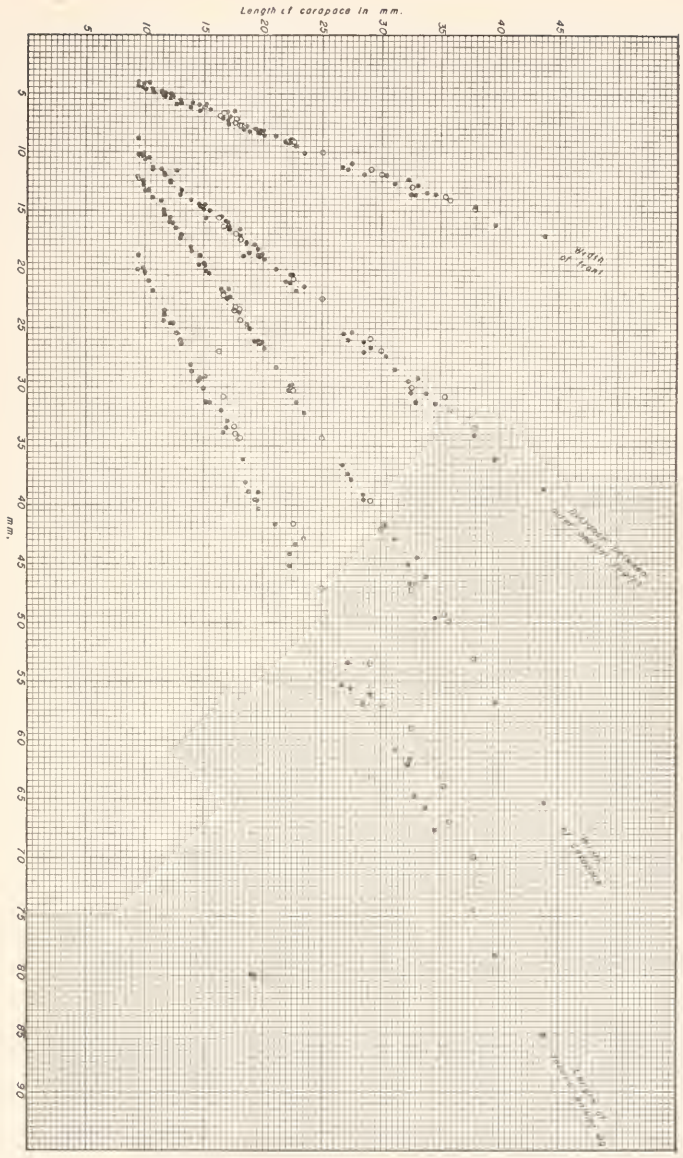

Fig. 4. Variation with growth in *Potamon* (*Potamonautes*) *montivagus*. Open circles indicate measurements of specimens from Nchenachena, Nchisi Mountain, and the Chitala River.

Tanganyika Territory, and the Taita Mountains and Kibwezi, Kenya Colony, in the more concave and less oblique post-frontal crest, the tectiform mesogastric groove, the shallower gastro-cardiac furrow, and the much more prominent ischial groove on the outer maxillipeds. From *P. inflatus* (H. Milne Edwards, 1853) from Natal it is distinguished by the narrower front, less sinuous post-frontal crest, and less inflated branchial regions. It is apparently a larger species than *P. infraraallatus* (Hilgendorf, 1898) from the Usambara Mountains, Tanganyika Territory, and it lacks the sternal swellings at the bases of the chelipeds characteristic of that species. It is also larger than *P. johnstoni unisulcatus* Rathbun, 1933, from the Uluguru Mountains, Tanganyika Territory, and the carapace is more convex and the post-frontal crest more concave. The carapace of *P. montivagus* is less convex, the branchial regions much less swollen, and the front less vertical than in *P. loveridgei* Rathbun, 1933, from Ujiji, Tanganyika Territory. It is somewhat larger than *P. luchoensis* Rathbun, 1904, from the Belgian Congo and the carapace is less inflated, the legs shorter and stouter, and the ischial groove on the outer maxillipeds much more pronounced. From *P. perlatus* (H. Milne Edwards, 1837) from the Cape of Good Hope it differs in having the carapace less convex, the post-frontal crest curved forward laterally rather than straight and oblique, the H-shaped depression deeper, the front distinctly narrower, and the legs stouter. It is a larger species than *P. regnieri* Rathbun, 1904, from the French Congo and it has a distinct mesogastric groove, more concave post-frontal crest, and stouter legs. It appears to be very near *P. reichardi* (Hilgendorf, 1898) from Tanganyika Territory but it is apparently larger, the branchial regions are typically less swollen, the legs more robust, the penultimate somite of the male abdomen slightly longer, and the male pleopods different in specimens of comparable size. *P. rodolphianus* Rathbun, 1909, from south of Lake Rudolf, Kenya Colony, is based on juvenile specimens which are too young to furnish adequate characters. *P. montivagus* might easily be confused with *P. rothschildi* Rathbun, 1909, from Kenya Colony but it is apparently distinguished from that species by the much deeper ischial groove on the outer maxillipeds, the less gaping fingers on the major chela, and the less spinous carpal and propodal joints of the walking legs. From *P. sidneyi* Rathbun, 1904, from Natal it may be separated by the more convex post-frontal crest and the very different male pleopods. It is a larger species than *P. stanleyensis* Rathbun, 1921, from the Belgian Congo and it has the carapace less

convex longitudinally, the post-frontal crest more convex and less oblique, no strong denticle behind the second carpal tooth on the chelipeds, and the legs more robust. Finally, although it superficially resembles *P. usambarae* Rathbun, 1933, from the Usambara Mountains, Tanganyika Territory, *P. montivagus* is a much larger species and it has a broader front which is not distinctly bilobate, and very different male pleopods.

GRAPSIDAE

Sesarma (Sesarma) meinerti de Man

Sesarma meinerti de Man, 1887, pp. 648, 668.
Sesarma (*Sesarma s.s.*) *meinerti* Tesch, 1917, pp. 171, 246 (synonymy).
Sesarma meinerti Cott, 1930, pp. 679–692, text-figs. 1–4, pl. 1.

1 ♂ (M.C.Z. 12621). Beira, Mozambique. 17. vii. 48.

Cott has given an interesting account of the habits and protective coloration of this species at Beira.

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ZOOLOGICAL RESULTS OF A FIFTH EXPEDITION TO EAST AFRICA

VII

ITINERARY AND CONCLUSIONS

BY A. LOVERIDGE

with an

APPENDIX ON THE AVIFAUNA

BY C. W. BENSON

with six plates

CAMBRIDGE, MASS., U. S. A.

PRINTED FOR THE MUSEUM

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INTRODUCTION

In the summer of 1948 the author, financed by grants from the Museum of Comparative Zoology and Penrose Fund of the American Philosophical Society, proceeded to Nyasaland to investigate the dwindling fauna of its surviving montane forests.

No adequate appraisal of the present situation is possible without giving some consideration to the human factors involved. During the journey from Tete that, on September 16, 1859, culminated in David Livingstone's discovery of Lake Nyasa, he encountered innumerable burnt-out villages and reported that intertribal conflicts and raids by Arab slavers were affairs of almost daily occurrence.

One consequence of these conditions was that the more peaceful agriculturists, seeking refuge from the aggressive warrior tribes, fled to the mountains where they made clearings in the forests for cultivation. The ceaseless demand for fresh land that characterizes the shifting agriculture practiced by Africans, eventually resulted in the destruction of the forest.

However, not agriculturists but alien pastoralists were the chief offenders. In November, 1835, the Ngoni, retreating northwards from their Zulu kinsmen, crossed the Zambezi near Tete and, under the leadership of Zongandaba, headed towards Lake Tanganyika subjugating or massacring the tribes encountered en route. Many Ngoni settled in the highlands west of Lake Nyasa in what is now known as Angoniland. There, to provide grazing for the cattle they had captured, they destroyed vast tracts of forest. The results of this

prodigality are being reaped today in the form of erosion[1], drought and desiccation.

Intertribal fighting, slave-raiding, famine, pestilence, and preventable diseases which had been acting as checks on the growth of population, have largely ceased to operate since May 14, 1891, when Great Britain declared a Protectorate over Nyasaland, a country but little larger than the State of Indiana. Ten years later a census showed that in 1901 the indigenous population numbered 736,724

1911	"	"	"	"	969,183
1921	"	"	"	"	1,199,934
1931	"	"	"	"	1,599,988
1945[2]	"	"	"	"	2,044,707

Such increases in an agricultural population lead to continuous demands on land. Surreptitious inroads on the more remote forests are still being made despite the efforts of the Forestry Department; the latter would require a much larger staff if adequate protection is to be accorded the widely scattered Forestry Reserves.

"Nearly the whole of Nyasaland has at one time been covered with forest . . . the greater security of the last thirty or forty years has accelerated the process of forest destruction . . . Virgin forest is mostly limited to areas unsuitable for cultivation or remote from water." So wrote Murray (1932, pp. 305–327) from whom I have culled the information contained in the following paragraph.

TROPICAL RAIN FOREST no longer exists, but *Chlorophora excelsa*, *Erithoplaeum guineense* and *Syzigium guineense* may represent survivals.

EVERGREEN BROAD-LEAFED FOREST persists in many gullies, and as true forest in the ravines and on the plateaus of high mountains like Mlanje, Cholo, Nchisi and the Vipya range. The total area probably does not exceed twenty square miles if North Nyasa is excluded. There, in the Misuku Mountains, larger strips are reported. This high forest has close canopy, together with woody lianas, epiphytic ferns, moss, lichen, orchids, much undergrowth and deep humus soil.

[1] No estimate of its extent is known to me, but Thomson King (1953, "Water: Miracle of Nature") states that the rivers of the United States are annually depositing 780 million tons of topsoil in the surrounding oceans. Assuming this estimate to be correct and other factors equal, then Nyasaland may be losing something like 10 million tons of soil a year, the area of Nyasaland being roughly about a 78th that of the Continental United States.

[2] In 1941 no census was taken on account of World War II.

EVERGREEN CONIFER FOREST. A patch of Kenya Pencil Cedar (*Juniperus procera*) still exists on the Nyika Plateau, the most southerly place in its range. Mlanje Cypress (*Widdringtonia whytei*) and *Podocarpus milanjeanus* survive in the ravines, valleys and plateaus of Mlanje Mountain between 4000 and 7000 feet.

Shortly after the publication of my (1933, pp. 27–43) zoogeographical conclusions regarding the surviving montane forests just across Nyasaland's northern frontiers, R. E. Moreau's (1933, pp. 415–435) much more comprehensive paper appeared. In his discussion of "Pleistocene Climatic Changes and the Distribution of Life in East Africa," Moreau concludes that *continuous* evergreen forest may well have persisted to a much later date than that which I had cautiously suggested. He points out that after the Kamasian epoch in which the great West African forest was continuous with the present "forest islands" of the East, interruption apparently resulted from adversely dry conditions supervening.

In recent years geological research in East Africa has unquestionably established the occurrence, in late Tertiary times, of three pluvial periods, the first of which was the heaviest. During these times of greater precipitation the forest sheet may have been established all the way from Elgon through Kilimanjaro to the Usambaras on the East Coast as recently as 12,000 years ago. Moreau then considered it less likely that the connection extended to the Ulugurus or that that range was linked by forest with the mountains immediately north of Nyasaland. Thus conditions favorable for subspecific differentiation have only existed for a period of about 12,000 years. Moreau also considers that if a general increase of from 15 to 20 inches of rainfall occurred throughout East Africa, this would be adequate, in time, to reestablish forest over the greater part of the country — assuming, of course, no interference by man. For human agency, quite as much as a diminishing rainfall, is responsible for the present situation as regards forests.

As is now generally recognized, the fauna adapted to life in the cool and damp conditions prevailing in montane primary forests, cannot long survive the destruction of its habitat. Grass, scrub and secondary growth spring up in abandoned areas, into which moves the widespread savanna fauna of the surrounding region. It was in the hope of ascertaining how much of Nyasaland's primary forest fauna survived, that this expedition to the Protectorate was undertaken July 17, 1948 to April 17, 1949.

1948 ITINERARY

BEIRA, MOZAMBIQUE. 19°49′ S., 34°50′ E. Alt. *circa* 25 feet.
Docked on Saturday, July 17; entrained for Blantyre on the 19th.

As my time was occupied by customs clearance, arranging railway accommodation and consigning baggage, only two afternoons were available for collecting and little was obtained besides some lizards and a snake. This was disappointing as Beira is type locality for *Bufo taitanus beirae* and *Rana ruddi*, besides some birds and mammals.

BLANTYRE, NYASALAND. 15°48′ S., 35°00′ E. Alt. 3500 feet.
Arrived July 20, and left by lorry on the 26th.
Temperatures range from 50° to 96°, while the annual rainfall averages 59 inches. This occurs between November and April with the heaviest downpours in February and March. In July it was dry and dusty.

Blantyre, the earliest settlement in the Shire Highlands, is a small but thriving township situated in undulating country. Avenues of *Eucalyptus* line the roads and many other introduced trees and ornamental shrubs are to be seen in the gardens. On the surrounding hills is much open *Brachystegia* woodland except where cleared for native plots. Some surviving forest flanks the Mudi River where it flows along below the Golf Course.

As, during our stay, I was engaged in opening crates of equipment and stores, repacking them in more manageable loads, engaging natives, and making other preparations for *ulendo*, no collecting was attempted. A local naturalist, Mr. B. L. Mitchell, donated the few specimens recorded as from Blantyre. Blantyre is type locality for a green snake (*Chlorophis shirana* = *Philothamnus i. irregularis*) and a shrew (*Crocidura occidentalis hera*), both of which I subsequently obtained at Cholo, just 26 miles away.

LIKABULA RIVER, foot of MLANJE MTN. 15°55′ S., 35°40′ E. Alt. 2100 feet.
Arrived in afternoon of July 27, and left at 10.15 A.M. on August 7.
During our ten-day stay it often clouded over, accompanied by a sharp drop in temperature; however, rain fell only on three or four occasions and then chiefly at night though once it continued until noon.

Our tents were pitched on the hillside about a hundred yards from the river and the Forestry Depot to which timber is brought down daily from Chambe Plateau. Situated at the end of a motorable track, the Depot is also at the junction of the trails leading to both Chambe and Lichenya Plateaus. Another reason for its selection as

our first camp was due to the Vernay Expedition's report that it was a good locality for reptiles, besides being as good as any other place in which to train skinners on common savanna mammals before going up the mountain.

Mr. F. H. France, the Forestry Officer in charge of the Depot, informed me there was good evidence to show that the whole area was heavily forested about 2000 years ago. Today the surrounding slopes supported only *Brachystegia* orchard forest and a scattering of *Uapaca* trees among which a rank growth of dry grass rose to heights that varied with the degree of erosion on the hillsides. Much larger trees and a dense tangle of thorny undergrowth grew among the jumble of great boulders that flank the moderate-sized river, whose rock-girt bed indicated that its flow was formerly much greater; probably still is during the monsoon rains.

Despite our visit coinciding with the dry season, frog collecting got off to an auspicious start with Mrs. Loveridge collecting *Arthroleptis boulengeri* and *Rana ansorgii*, two species entirely new to Nyasaland. Four other kinds of amphibia taken in the same patch of marshy ground represented species or races that had not been recorded previously under their correct names.

Also new to the Protectorate was a Greater Plated-Lizard (*Gerrhosaurus m. grandis*), but like the dozen other forms of reptile life taken at Likabula, all were of common, widespread, savanna types.

Best of the birds was a Cuckoo-Falcon (*Aviceda c. verreauxi*), a hawk with which I was previously unacquainted. However, except in the immediate vicinity of the river and the Frances' garden, bird life was astonishingly scarce, the dry woodland still and lifeless in the heat.

By a curious coincidence the most abundant mammal, consequently the species on which the skinners were trained, was apparently an undescribed race of fat-mouse and has been called *Steatomys p. nyasae* with Likabula River as type locality. Other than rodents, mammals appeared uncommon. An elephant-shrew (*Rhynchocyon c. cirnei*) was brought in by a native, the only example of the typical form we were destined to get during the entire trip. Spoor of leopard, civet and mongoose was present on the paths and an occasional baboon or blue-monkey seen along the river.

LICHENYA PLATEAU, MLANJE MTN. 16°02′ S., 35°33′ E. Alt. 6000 feet.

Arrived August 7, and left with carriers at 3.30 P.M. on the 23rd.

From the 7th to the 15th the weather remained fine except for a tendency to cloud over in the afternoons. On the night of the 15th a biting gale arose,

and torrential rain fell from about noon on the 16th till the following morning when it changed to a fine white mist that blotted out the landscape, visibility being restricted to from 50 feet to 50 yards as the wraiths of wet white mist blew about. June to September being the coldest months, reptiles were quiescent.

In view of the weather conditions we were very fortunate in being offered the use of "Araloon" cottage by its owner, Mr. A. R. Westrop of Cholo, whose kindness was much appreciated. This cottage was conveniently situated in relation to the surviving patches of evergreen forest.

Most of the forests consisted of Mlanje Cypress (*Widdringtonia whytei*) that was, except for recent plantations, chiefly confined to sheltered ravines and the main valley bottoms, but copse-like stands survived on the undulating, wind-swept moorland whose tussocky grass was studded with everlasting flowers. Here and there was a scattering of scorched *Proteas*, persisting despite the annual grass-burning of which the most recent had swept much of the Lichenya just a fortnight before our arrival on the Plateau. The grass-burning is initiated and supervised by the Forestry Department to prevent further destruction of the frequently-bracken-surrounded patches of forest. Relatively few of the trees are over thirty feet in height, but the majority are heavily coated with moss and lichen while many display waving tresses of *Usnea*. Unfortunately these forest patches are well-nigh impenetrable on account of the dense undergrowth, but digging in the rich loam about the buttress roots of the larger trees or under logs lying at the forest fringe gave little evidence that they harbored any of the reptile forms characteristic of the tropical forests nearer to the equator.

Within the forest only two species of amphibia were encountered. At this season Whyte's Frogs (*Arthroleptis s. whytii*) were found hibernating in moss, in rotten wood on the trees, or in the soil among their roots. A very few were found associated with Ansorge's Frogs (*Rana ansorgii*) in a rivulet meandering through a small patch of woodland. The *Rana*, like other members of the genus taken on the plateau, is more properly a moorland species.

Apart from some semi-hibernating snakes (*Psammophylax t. variabilis*), of which we secured topotypes, the only active reptiles seen were skinks. One, the common *Mabuya v. varia*, the other a race (*M. bocagii mlanjensis*) of a species new to Nyasaland, but the Vernay Expedition, which stayed at Forestry Cottage (24.vi.–18.vii.46),

collected a small skink (*Seclotes arnoldi*) previously known only from Selinda Mountain in Southern Rhodesia, and a solitary pygmy chameleon (*Brookesia p. carri*) that was described as new because it differs somewhat from the typical form inhabiting Mlanje's lower slopes.

The avifauna of Lichenya Plateau has been dealt with in a paper by Belcher, more recently by Vincent (1933) who raised to 50 the number of recorded species. It is type locality for at least a dozen races of passerine birds but I collected topotypes of only four.

Mammals larger than rodents, of which we secured topotypes of *Praomys j. delectorum* and *Rhabdomys p. nyasae*, were decidedly scarce. Blue monkeys (*Cercopithecus m. nyasae*), much harassed by man and leopards, kept to the denser interiors of the larger forest but I managed to get one. Another topotype was a rock hyrax (*Heterohyrax s. manningi*) obtained on nearby Chambe Plateau. Of the race of blue duiker (*Cephalophus c. nyasae*) described from Mlanje I found only slots; klipspringers are said to occur on the rocky heights; bushbuck were present and wild pig may have been common in places.

CHAMBE PLATEAU, MLANJE MTN.

Visited on August 20th in search of hyrax, which we found in the fine forest; returned to Lichenya the same day, a walk of about 21 miles in all.

CHIRADZULU MOUNTAIN. 15°40′ S., 35°00′ E. Alt. 3900 feet.

Arrived August 25, and left by lorry on September 1st.

During our six-day stay the weather remained fine. Hot and sunny on the deforested, especially the rock-strewn, slopes; cool and even chilly in forested ravines or shady spots. Except for an occasional shower the chances of rain between July and September are remote.

Mr. C. D. P. T. Haskard, District Commissioner, kindly invited us to be his guests. His house, situated at 3900 feet, is just below the remaining patches of evergreen forest; the summit is 5500 feet.

Perhaps "woodland" would be a more appropriate word than forest, for it is almost entirely composed of a low secondary growth in which few trees exceed a height of more than 20 or 30 feet. These patches are separated by bracken-covered slopes or an orchard growth of the *Brachystegia-Uapaca* type. Scattered through the woodland are rocks, some of very large size. A few rivulets furnished the sole evidence of moisture, for deforestation and soil erosion has resulted in most of the streams drying up during the greater part of the year.

It would appear probable that this desiccation is responsible for

the disappearance of at least some of the 14 species of snails described from Chiradzulu. Their dry, and often crumbling shells were found deep in the dusty soil along the shady side of the larger rocks, in the interiors of dead trees, beneath bark and similar situations. Though considerable quantities, representing topotypes of six species, were collected by Mrs. Loveridge, all but half a dozen were dead. Later, five of the missing desiderata were obtained elsewhere.

Amphibia too were scarce, and the five kinds collected in streamlets were of species already met with at Likabula River camp. Similarly all but one of the half-dozen forms of reptiles taken at Chiradzulu were of savanna types, the exception being an arboreal gecko (*Lygodactylus a. angularis*) described from these Shire Highlands. This adaptable lizard now lives on the wall and thatch of the commissioner's house.

The avifauna of Chiradzulu has been comprehensively dealt with in a paper by C. W. Benson who lists 24 species. Needless to say, I saw no sign of the sylvicoline Green-headed Oriole (*Oriolus chlorocephalus*) originally described from Chiradzulu, but of which "few, if any, have been taken in Nyasaland since 1895." I did secure a topotype of a weaver (*Cryptospiza s. australis*) in the savanna scrub.

The native forester informed me that (*Cercopithecus p. whytei*) a non-valid race of monkeys no longer occurs on the mountain but small parties are to be found in the large riverine trees on the plain about five miles away. A spiny mouse (*Acomys selousi*) was the most interesting rodent trapped during our stay.

ZOMBA PLATEAU, ZOMBA MTN. 15°18′ S., 35°17′ E. Alt. 5000 (6647) feet.

Arrived late on September 1, and left at 7.30 A.M. on September 13.

On the morning following our arrival we awoke to find visibility restricted to 50 yards, the plateau being enveloped in a damp mist that caused the trees to drip as if it were raining. Similar conditions, accompanied by an inside temperature of 45°, prevailed until the 6th — the first clear dawn. Each morning thereafter the temperature rose slightly but was never above 56°. Official temperatures for the plateau throughout the year, range from 42° to 97°. Though on the 2nd the sun broke through for a time, before noon there began a steady downpour that lasted seven consecutive hours. However, this failed to activate the amphibia as the temperature remained too low.

Through the courtesy of the Nyasaland Government we were allowed to occupy Convalescent Cottage, close to the southern scarp of the plateau and directly above Zomba township which is situated on the lower slopes of the mountain between 2900 and 3100 feet.

Immediately behind the cottage was one of the extensive cedar plantations which are scattered over this section of the 60-square-miles of plateau. In this vicinity little, if any, original forest remains, apart from some gallery forest along the banks of the Mlungusi (Mulungusi) River whose numerous small falls are often set in sylvan surroundings of considerable beauty. In ravines and sheltered spots to the west, dense woodlands of small size provide refuge for survivors of the forest fauna, most of the plateau consisting of rolling grasslands.

Caecilians have been taken on the plateau, after rain, by Mitchell, but of the 10 species of frogs occurring there only one is a forest form, the rest being widespread upland or savanna types.

Of the score of lizards recorded from Zomba Plateau or township, only the arboreal *Lygodactylus a. angularis* and *Holaspis g. laevis* can lay any claim to be considered species of the primary forest, and both of them display considerable adaptability to savanna conditions. Of the 21 species of snakes taken on Zomba all but three are lowland savanna types; the exceptions (*Pseudaspis cana*, *Duberria l. shiranum* and *Psammophylax t. variabilis*) are, in East Africa, montane-meadow forms.

Though 15 kinds of birds were preserved from the Plateau, I failed to procure topotypes of any of the dozen species described from Zomba — unless one includes the beautiful plantain-eater (*Tauraco l. livingstonii*) whose type locality is Manganja at the south end of the plateau.

Of the 9 mammals described from Zomba only two, a dormouse (*Claviglis johnstoni*) and a thicket rat (*Thamnomys s. surdaster*) were collected. Indeed, apart from rodents and bats of which we preserved a dozen species, mammals were scarce, bushbuck being the only ungulates seen during our eleven days on the plateau.

Numerous invertebrates, including some of the eight snails which have "Zomba Plateau at 5000 feet" as type locality, were preserved, and two kinds of local crabs were found by Dr. Fenner Chase to represent undescribed species of which they became paratypes.

DEDZA, DEDZA DISTRICT. 14°05′ S., 34°07′ E. Alt. 4900 feet.

Arrived September 13 and left on 14th. Arrived December 21 and left on 22nd.

In September, 1930, the temperature fell to 32°, but the usual averages range from about 42° to 95°. The annual average rainfall in Dedza is only 42″.

Dedza Mountain is 7000 feet above sea level, Chongoni nearly 8000

feet. Being informed there was little, if any, primary forest left on either of these mountains we did not visit them. Such little collecting as we accomplished was carried out in the swamp a mile below the Angoni Highlands Hotel, where we put up for the night after long days on the road.

KASUNGU BOMA, KASUNGU DISTRICT. 13°03′ S., 33°28′ E. Alt. 3100 feet.

Arrived September 14 and left on 15th. Arrived November 24 and left on 25th. The Vernay Expedition stayed from August 18 to 23, 1946.

Temperatures in the district range from 50° to 84°, accompanied by an annual average rainfall of 28 inches.

In so dry a region water is something of a problem; consequently our tents were pitched near the administrative buildings on ground that has since been built over. Kasungu village lies about 60 miles west of Lake Nyasa in rather flat, scrub-covered country, with scattered hills here and there.

Apparently the herpetofauna of Kasungu would well repay investigation. During their brief stay the Vernay party collected a short-limbed skink (*Riopa m. modesta*), and just as we were leaving, Mrs. Loveridge caught a fine specimen of a handsome sand-lizard (*Ichnotropis capensis*); neither species had ever been taken in Nyasaland before.

MZIMBA, MOMBERA DISTRICT. 11°52′ S., 33°35′ E. Alt. 4500 feet.

Arrived September 15 and left on 16th. Arrived November 23 and left on 24th.

Temperatures average about 67° over the year, and the annual rainfall is around 33 inches.

Mzimba, 414 miles north of Blantyre on the mainroad to Tanganyika, is provincial headquarters for the Mombera district and a town of some size. The district covers 3200 square miles of eroded, undulating, wind-swept uplands at altitudes that are mostly between 3500 and 5000 feet. Both going to, and returning from, the North Nyasa district we put up at the excellent Government Rest House. Little collecting was done.

VIPYA PLATEAU, MOMBERA DISTRICT. Alt. 6000 feet.

Arrived September 16 and left on 20th.

Temperatures are likely to be somewhat lower, and the rainfall higher, than at Mzimba.

Our tents were pitched among a clump of fine trees in a clearing known as Macdonald's Camp. All about was rolling downland covered with dry, waist-high grass and scattered copses composed of trees that had managed to survive the annual encroachment of the periodic grass-burning. Along the marshy bottoms straggled woodland that scarcely merited the name of gulley forest despite a few fine trees. Hills and rising ground were stony, their eroded gravel-strewn slopes often almost devoid of vegetation of any kind.

The District Commissioner at Mzimba, Mr. C. W. Benson the well-known ornithologist, warned me that we would find the Vipya Plateau disappointing and suggested our time would be spent to better purpose further north. I had hoped to obtain specimens of the bush-fowl (*Francolinus s. doni*) that Benson had described from this plateau, but though I flushed a covey of three I was not quick enough to get a shot. We did get some elephant shrews, plantain eaters, and a rare limbless lizard (*Melanoseps a. ater*) usually associated with evergreen or gallery forest; our experiences entirely confirmed Benson's views.

We were, of course, camped towards the western side of the vast Vipya Plateau where it rises from the Mombera uplands. I wish it had been possible — but this would have involved a tedious *ulendo* and carriers are exceedingly difficult to enlist for such a purpose — to visit the forest surviving on the deeply fissured eastern side which slopes steeply to the lake shore. Along its northern end the plateau is mountainous and separated by the deep trough of the Henga Valley from the steep-sided Nyika.

KATUMBI, MOMBERA DISTRICT. 10°48′ S., 33°32′ E. Alt. 4000 feet.

Arrived on the evening of September 20 and left by lorry on the 21st.

Through the courtesy of Mr. Brisley of Mzimba, we received permission to put up for the night in the Rest House of Wenella Labour Camp.

The lynx and other Katumbi skins were donated by Mr. C. W. Benson; we ourselves undertook little or no collecting. Shortly after leaving Katumbi, while driving through the dry orchard woodlands that cover much of the countryside in the vicinity, I shot a pair of bush squirrels (*Paraxerus c. soccatus*) which raced across the road just ahead of us. These were near topotypes, for the form was described from "VWAZA, HEWE RIVER, NORTHERN ANGONILAND." On the Survey Department map of 1942 "Vwasa Marsh" is shown as close to Katumbi where the mainroad leaves Nyasaland for Northern Rhodesia, while "Newe River" appears on Dixey's physical map.

CHINUNKHA, NORTH NYASA DISTRICT. 9°40′ S., 33°20′ E. Alt. 4300 feet.

Arrived September 21 and left on 22nd. Returned October 18 and left by lorry on the 21st.

On the first occasion we spent the night in the Veterinarian's house. When we came down the mountain we pitched our tents in the nearby clearing of the Native Co-operative Gheery. Chinunkha Village, Chief Nyondo's headquarters, was about a mile away.

In late October a hot wind blew continuously from midday, increasing to gale force after sunset when the heated air rising from the plains resulted in winds rushing down the mountain at whose foot they whirled along, raising straws and leaves in the familiar manner of dust-devils.

Only widespread savanna species were encountered. I had hoped to get examples of the water snake (*Lycodonomorphus r. whytii*) whose alleged type locality — Fort Hill — is only about eight miles away.

MATIPA FOREST, MISUKU MOUNTAINS, NORTH NYASA DISTRICT. Alt. 6000 feet.

Arrived by foot *ulendo* on September 22, left on October 18th.

The climate was by far the most delightful we had encountered so far. The nights were distinctly cool, the early mornings chill but sunny, with temperatures occasionally rising as high as 80° in the afternoon. Very little rain fell during our month's stay at the forest edge.

From Chinunkha a steep climb of from three to four hours via Chief Mwenechiula's huts brought us to the Matipa-Wilindi Ridge, which hardly deserves the name of plateau. Benson regards it as about ten miles east north east of Fort Hill. On July 22, 1896, Alexander Whyte came up from Chirenji, an abandoned mission station, and allegedly reached the mountain four miles east of its highest point. He made camp at the edge of virgin forest in a district locally known as KEKOMBE (a type locality variously spelled KOMBE or KOMBI) The name KOMBE appears to be unknown today, but C. W. Benson tells me that when, as District Commissioner, he visited the mountains, he talked with an old native who recollected a European (undoubtedly Whyte) who came there shooting monkeys in the forest. Benson believes that I camped in substantially the same area as did Whyte — an opinion supported by my securing five of the six vertebrates first discovered by Whyte at Kombe.

The Misuku Mountains were first colonized by Sukwa, "one of the most primitive tribes in Nyasaland, [who] came originally from the hilly areas near Tukuyu in southern Tanganyika. Nomads, they lived mainly on wild berries and fruits, and were so prodigal as to fell trees

in order to obtain the fruit, thus rapidly cutting out the timber and shrubs. Deprived in consequence of an adequate supply of the fruits which were their staple food, they were driven to primitive agriculture." (East Africa & Rhodesia, 19.x.1944, p. 154).

"With the advent of the hoe, incredibly steep hillsides were farmed and massacred. As hillsides thus treated, and valley bottoms in which the tribal cattle lived, were rendered unproductive, villages were compelled to shift to adjacent untouched areas. This was the policy of shifting agriculture . . . With the further addition of cattle as tribal wealth, the damage and erosion on all sides were accelerated, through sheer ignorance on the part of the agriculturist or cattle-owner. By 1937 the plight of the Sukwa, numbering some 2,500 to 3,000 people, with 3,500 to 4,000 head of cattle, had become critical." (Major D. N. Smalley, 1944, Nyasaland Agricultural Quarterly Journal).

The track from Chinunkha wound up through this devastated region and it was good to know that, as a result of the efforts of the Agricultural Department, the destruction had been arrested, not without considerable opposition from the conservative African peasantry who preferred to practice the shifting agriculture of their forefathers involving fresh inroads on the forests.

Matipa Forest, beside which we camped, was unquestionably the finest we met with anywhere in Nyasaland, its fauna and flora more closely resembling those of the equatorial rain forests of Tanganyika Territory. Tree ferns of amazing grace and beauty added to its tropical appearance, and when we entered it as dawn was breaking the pervading stillness was periodically broken by the discordant cries of huge hornbills (*Bycanistes b. brevis*). Lonesome trogons (*Heterotrogon v. vittatus*), with rich metallic-green backs and rose-pink breasts, sat motionless as they whistled softly yet penetratingly for mates. A party of blue monkeys feeding in the canopy far beyond the range of a shotgun, betrayed their presence by dropping discarded fragments which pattered upon the leaf-strewn path that traverses the forest. More rarely our attention would be attracted by the "kuwhek, kuwhek," cry of an orange-red squirrel whose pelage is difficult to detect among the abundant red-brown epiphytic ferns that smother the larger limbs of the great trees. Convenient highways for the squirrels are provided by the tangle of rope-like lianas that festoon, or depend from, most of the trees. Blocks of forest like Matipa and Wilindi are frequently connected by gully growth along the steep-

sided ravines in whose bottoms turbulent little streams foam downwards among the rocks.

Patches of forest were frequently surrounded by extensive belts of well-nigh impenetrable bramble and bracken, the adjacent deforested hillsides, with or without a scattering of stunted xerophytic trees, being under grass. Where this had been burnt off, though the rains were not due for at least a month, the ground was frequently carpeted with short-stemmed, wild flowers — scarlet, purple, blue, yellow, white.

This savanna habitat was faithfully reflected by seven of the eleven forms of amphibia encountered during our stay. Within the forest proper, frogs were extremely scarce and it was only after prolonged and persistent search that a solitary topotype of *Arthroleptis s. whytii* was secured. An abandoned clearing, whose maker had probably been evicted, furnished an exception. There, in marshy ground beside a shallow stream, were many *Phrynobatrachus u. ukingensis* new to Nyasaland. Growing in the marsh were some wild bananas that harbored numerous sedge-frogs (*Hyperolius p. punctiventris*).

Hitherto no reptiles had the Misuku Mountains for type locality; however we secured several pygmy chameleons (*Brookesia nchisiensis*) and a good series of limbless skinks (*Melanoseps ater misukuensis*), both forms associated with primary forest. Of the snakes three were sylvicoline, an opisthoglyph (*Crotaphopeltis h. tornieri*) and tree-viper (*Atheris n. rungwensis*) had never before been taken in Nyasaland, while a western forest cobra (*Naja melanoleuca*), captured by Mrs. Loveridge, was previously known in Nyasaland from only one or two specimens.

Of the four species of birds collected at Kombe by Whyte, and that were later described as new, I collected *Arizelocichla m. masukuensis*, *Scicercus r. johnstoni* and *Cisticola nigriloris*, the latter of course outside the forest in open grasslands. Whyte was apt to overestimate his altitudes and that of Kombe or Kombi was said to be 7000 feet. My camp was nearer 6000 feet.

Both mammals — *Aethosciurus lucifer* and *Sylvisorex s. sorella* — described from Whyte's Kombe collection were secured, the forest shrew being a diminutive species with excessively long tail. Three rats that we obtained on the Misukus were made paratypes of a new race (*Dasymys i. alleni*); Ilolo on Rungwe Mountain being selected as the type locality.

CHERE RIVER BRIDGE, NORTHERN RHODESIA. 10°45′ S., 33°30′ E. Alt. 4000 feet.
Arrived about noon October 21, and left very early on the 22nd.

Stayed the night in the Public Works' Department Rest House beside the bridge. This was situated in arid, recently burnt-over and still smouldering, woodland on the Northern Rhodesian side of the border, the only one in which we did any collecting. The principal acquisitions during our brief stop-over were *Agama* lizards and *Achatina* snails.

NCHENACHENA, SLOPES OF NYIKA MOUNTAINS. 10°23′ S., 33°28′ E. Alt. 4600 ft.
Arrived October 22, and left on foot for Plateau on 27th. Returned on November 19, and left by lorry on the 23rd.

Weather fine except that at 6 A.M. on October 26th, following two vivid flashes of lightning, a wall of rain advanced across the plain and enveloped us in a downpour that lasted several hours.

On both occasions we stayed at a then-unoccupied brick bungalow on the mountain side above, and about a mile from the main group of Agricultural Department buildings.

Directly opposite, across the Henga Valley shimmering in a heat-haze, rose the Vipya, its summit sharply outlined against the pale blue sky. Only on one short stretch of the long skyline were any trees silhouetted; at this distance the precipitous sides appeared gray-green broadly streaked with sandy brown where erosion had stripped away the last vestiges of vegetation. Below the bungalow were clumps of bananas, tung trees in bloom, and the vivid green foliage of an experimental coffee plantation showing to advantage against the rich red soil. Behind and above the bungalow were scrub-covered slopes, steep and eroded.

Though rodents were plentiful, no sooner were they trapped than they were ruined, as specimens, by the omnivorous ants that swarmed everywhere. While I was making preparations for our ascent to the plateau our boys collected some reptiles and amphibians in the vicinity of a stream that flowed nearby. In anticipation of our arrival Major D. N. Smalley, in charge of this outpost, had kindly had the path cleared all the way up the 4000-foot ascent from bungalow to plateau. Not only that, but with characteristic helpfulness he also made arrangements for the carriers necessary to transport our loads, both up and down.

NYIKA PLATEAU ABOVE NCHENACHENA. 10°10′ S., 33°35′ E. Alt. 7500 feet.
Made camp on October 27, and returned to Nchenachena on November 19.

November is the best month in which to visit the plateau. Whyte's men suffered severely from the cold in June, for during the coldest months the temperature falls below 40° by day and frosts at night are not unusual. November is said to be the most rain-free month on the Nyika but there were two deluges during our first night (October 28) when the roar of the rain on our canvas awnings awakened us all. As dawn broke, everything outside a radius of a hundred feet was seen to be enshrouded in a driving mist, a phenomenon repeated on several successive mornings. On November 6th a blustering gale, which raged for several hours, accompanied the swirling mist. From the 14th to the 16th we were enveloped in the penetrating chill of a clammy fog that condensed in beads of moisture on one's hair and clothes; periodically there were heavy rainstorms which did appear to arouse amphibian life.

Our tents were pitched on the site prepared for Dr. Leonard J. Brass, botanist of the Vernay Expedition, who spent ten days on the plateau in August, 1946, while the hut (figured on the cover of the Journ. N. Y. Botanical Gardens for June, 1948, **49**, No. 582), provided through the courtesy of Major D. N. Smalley, also served us as a cookhouse. The site, though twenty minutes walk from the nearest patch of forest, was selected on account of access to water, procurable from a tiny stream that meandered through the swampy valley immediately below the tent. A further consideration had been protection from the almost incessant high winds that periodically rise to gale force at night.

Dr. Brass is of the opinion that the greater part of the Nyika's rolling downlands were formerly forested; the pitiful remnants are now restricted to steep-sided gullies and precipitous escarpments. Deforestation is attributed to the annual firing of the grass by Apoka tribesmen who sought refuge on the plateau when their country was invaded by Angoni warriors. Today, except for a few scattered settlements on the sheltered southwestern slopes, the 900 square miles of the Nyika is uninhabited.

With one or two exceptions the amphibians and reptiles collected by Whyte on the Nyika prove to be lowland forms that must have come from the lower slopes rather than from the plateau as alleged. Of the half-dozen kinds of frogs collected by us in series, three (*Bufo t. nyikae*, *Phrynobatrachus u. nyikae* and *Arthroleptis x. nyikae*) represented undescribed forms differing consistently from their near relatives on the Uzungwe, Ukinga and Rungwe Mountains. As two of them are of non-forest species it suggests that upland meadows or marshes have long been an established feature of the Nyika landscape.

Similarly the lizards furnished three new forms (*Chamaeleo g. nyikae*, *Mabuya hildae* and *M. varia nyikae*) though the snakes (*Duberria l. shiranum* and *Psammophylax t. variabilis*) represented more widespread upland species.

Of the dozen species of birds described from the Nyika we secured topotypes of eight, among them such choice things as *Turdus o. nyikae* and *Nectarinia j. salvadorii*, both nesting; besides a series of the beautiful *N. f. cupreonitens* which was also present.

Strangely enough only four (*Rhynchocyon c. hendersoni*, *Crocidura b. nyikae*, *Otomys n. nyikae* and *Equus b. crawshaii*) of the ten mammals that have been named from the plateau, were taken during the three weeks we spent on the Nyika.

I left at 7.45 A.M. on the 19th and though I turned aside to shoot a topotypic Nyasa Dusky Flycatcher (*Alsconax a. subadustus*) at 6000 feet, and stopped to look for lizards, I was back at Nchenachena in a little more than an hour. I might add that the ascent only took me 2 hours and 10 minutes though a subsequent traveller (Van der Post, 1952, Venture to the Interior), has represented the ascent as being something formidable. The flycatcher was shot in the *Brachystegia* woodland which studded the eroded slopes at that point. On November 19th the trees, which were just breaking into leaf, were alive with cicadas shrilling in great abandon.

NCHISI MOUNTAIN, KOTAKOTA DISTRICT. 13°20′ S., 34°00′ E. Alt. 5000 feet. Arrived November 25, and left on December 13.

At the time of our arrival dawn usually found the mountain enveloped in a dripping mist that terminated in a sharp shower unless burned off by the rising sun breaking through the clouds. There were, however, several delightfully sunny days; others remained heavily overcast and resulted in typical monsoon downpours. Unfortunately such storms were accompanied by a drop in temperature so that most frogs and toads, chilled through and through, remained torpid.

We occupied the old Boma (now the forestry officer's house I believe) where the Vernay party stayed in late July and early September, 1946. It is situated in a clearing surrounded by *Brachystegia* woodland at about 4500 feet, I should think, and some distance below the true forest.

Evergreen forest on Nchisi consists of several hundred acres confined to the eastern slopes of the ridge that extends along the summit. In most places it is surrounded by a belt of bracken and rank grass, in others by shrubbery whose components have been identified by

Brass as *Tecoma, Dombeya, Dissotis, Cassia* and *Hibiscus*. Once inside the forest it is often possible to move freely among the buttress roots of the tall timber whose dominant species is *Piptadenia buchananii* according to Brass. Brass, who had not seen the Misukus, considered Nchisi showed less evidence of disturbance by man than any other forest he visited in Nyasaland. In the absence of a resident forestry officer, perhaps credit for this state of affairs should go to the lions which lie up in the forest during the hours of daylight.

During our stay on the mountain, mammals referable to a score of different species were collected, the rarest being a series of *Beamys major*. Half a dozen were arboreal types like *Paraxerus p. palliatus, Claviglis nanus, Dendromus w. whytei*, etc., but their association with primary forest may be considered somewhat fortuitous. Of the dozen species of amphibia preserved only three (*Arthroleptis boulengeri, A. s. whytii* and *Rana o. gribinguiensis*) occurred in the forest. The rest, without exception, were widespread savanna forms that had invaded the eroded slopes. Reptiles were almost equally disappointing, though the only sylvicoline species (*Brookesia nchisiensis*) turned out to be undescribed. Its range, however, extends northwards to Rungwe Mountain.

CHITALA RIVER, DOWA DISTRICT. 13°35′ S., 34°15′ E. Alt. 1982 feet.

Arrived by lorry on December 13, and left again on the 21st.

The average temperature for the district is 69°, the average annual rainfall 35 inches. Rain was essential if I was to secure the amphibia for which I had come to Chitala River, but the sandy river bed was dry and not a drop of rain fell during our stay. This was unusual, and in order that I might estimate my chances, our host, the Director of the Empire Cotton Growers' Experimental Laboratories, furnished me with the following summary:

Rain fell during or between	*Number of years*
November	1
December 1–7	7
December 8–14	2
December 15–21	5
December 22–28	2
December 29–31	1
Total years	18

During the week we were guests of Mr. H. C. Ducker, who graciously placed at my disposal a vacant office and its well-equipped laboratory complete with sinks and running water.

My labels read rather misleadingly "Chitala River near Salima." Salima, though Post Office for the Experimental Laboratory, is actually about twenty miles to the southeast and near to Domira Bay. My object in so labeling was to avoid all possibility of confusion with Chitala near Zomba, or a third Chitala in Chikwawa District.

The Chitala, which has a deep sandy bottom, is apt to cease flowing on the surface in late May or early June. Water, however, can usually be obtained by digging; though towards the end of the dry season in November one may have to excavate as much as ten feet deep for it. At no time does the river reach Lake Nyasa, but loses itself among the *Acacia albida* and elephant grass of the flooded flats between Domira Bay and Makanjila's Village.

It was while on the staff of the Experimental Station that Mr. B. L. Mitchell captured the frogs that were subsequently, but mistakenly, described as new by Dr. A. C. Hoffman, with type locality given as "Chitiala" (*sic*). Of these four forms I captured only topotypes of *Phrynobatrachus chitialensis* (= *P. u. mababiensis* FitzSimons) about some stagnant pools retained among the rocks in the bed of the Chitala. From another pool, resulting from a rainstorm that occurred just before our visit, in a corner of one of the new dams constructed under Mr. Ducker's direction, a series were discovered that have been named *Phrynobatrachus duckeri*. Eleven kinds of amphibia, besides reptiles, birds and mammals, were collected during our week at the Station.

MPATANJOKA near Salima, DOWA DISTRICT.

Visited on December 15, when some collecting was accomplished.

MNEMA, MAKANJILA, LAKE NYASA.

Visited on December 16, being driven over from Chitala by Mr. Ducker. It is situated on sandy flats in an area subject to flooding.

HYNDE DAM, LIMBE, BLANTYRE DISTRICT. 15°50′ S., 35°03′ E. Alt. 3800 feet.

Drove over from Blantyre on December 27th and spent a few hours.

Collected frogs of several widespread forms around the margins of the shrinking dams which are situated in undulating uplands with a flora similar to that described for Blantyre.

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KASUMBADEDZA, TETE DISTRICT. 16°07′ S., 33°30′ E. Alt. 250 feet.

Arrived January 5, and left by lorry on the 31st.

I am indebted to the Intendente of Tete for the information that during my stay in January, 1949, the mean temperature was 90.5°, the average maximum 104.7°, the absolute maximum 109.4° (on several days), the average minimum 71.6°, the absolute minimum 64.4°. Brief showers fell on three days and the total precipitation for the month was only 0.67 inches; the biggest fall, 0.28 inches, occurred on January 17th. At best the average annual fall at Tete is but 21.2 inches, so that the rains, which normally fall between November and March, had, up to the time of my departure, signally failed.

Camp was made beneath a great fig tree on the outskirts of Kasumbadedza, a Nyungwe village of considerable size situated on slightly rising ground about a quarter mile from the south bank of the Zambezi, at a point about five miles west of Tete; the uninviting, intervening terrain being arid and eroded.

At this low altitude the flats directly in front of my tent shimmered with heat during the noonday hours when scarcely a bird or beast was to be seen. In normal seasons these flats are intensively cultivated. Dry and dusty at the time of my visit they supported an extensive scattering of trees, chiefly acacia and a termite-resisting hardwood of moderate height. To the west an almost park-like appearance was imparted to the landscape by the many huge baobabs. Immediately behind the village the slowly rising, gravel-strewn ground was smothered by a mat of thornbush interspersed with patches of more open scrub. Solitary baobabs and trees of stunted growth projected from both. From the hills behind, broad ribbons of deep sand led down to the Zambezi; one of these dry watercourses to the east of camp passed through a rocky ravine much beloved by lizards. Another favorite collecting locality was the rocks scattered along a ridge that paralleled the Zambezi at one stretch between Kasumbadedza and Tete; they went by the name of Mwanza.

There is, of course, no evergreen forest near Tete and my purpose in visiting the place was to obtain as many topotypes as possible of the numerous vertebrates described from there about a century ago by Wilhelm Peters and others. Owing to the drought I captured representatives of only three of the eight topotypic frogs, but twenty-six of the forty reptiles and added a new one (*Pachydactylus tetensis*) to the list. With both birds and mammals I was moderately successful. An overall summary of the species obtained at Tete shows 23 (55 skins) mammals, 69 (146 skins) birds, 40 (315 alcoholics) reptiles, and 10 (291 alcoholics) frogs.

MPATAMANGA GORGE BRIDGE, BLANTYRE. 15°40′ S., 34°45′ E. Alt. 1000 feet.

On January 31 we paused while *en route* from Tete to Blantyre to do some lizard collecting among the rocks on high ground to the west of the road and a mile or two on the Tete side of the bridge. A new race of rock-lizard (*Platysaurus guttatus nyasae*) resulted, the first record of the occurrence of this genus north of the Zambezi.

DALLY'S HOTEL, CHIPOKA, L. NYASA. 14°20′ S., 35°10′ E. Alt. 1550 feet.

Spent the night of February 2 at this lakeside resort, and returned to do a little collecting in the vicinity on several occasions during the month.

CHOWE, MANGOCHE HILLS, FORT JOHNSTON DISTRICT. Alt. 3000 feet.

On February 12 I spent the morning collecting among the rocks on the *Brachystegia*-covered hillside above Dr. W. A. Lamborn's estate. As might be supposed, the herpetofauna consisted of such common savanna species as *Philothamnus hoplogaster, Thelotornis k. capensis,* besides various forms of *Mabuya* and *Rana.*

We had come about 25 miles from Mtimbuka, but distances among these hills are illusive. Fort Mangoche itself, at 5,450 feet, though only 14 airline miles from Fort Johnston, is said to be 29 miles by road and paths through the hills paralleling the eastern shore of Lake Malombe.

KAUSI VILLAGE, LAKE MALOMBE. 14°40′ S., 35°08′ E. Alt. ca. 1500 feet.

Spent February 25th collecting in the vicinity of this fishing village, 20 miles south of Fort Johnston, on the shore of Lake Malombe (Pamalombe on many maps owing to Livingstone transcribing the prefix pa- (= at) which local natives are apt to attach to place names). Malombe is connected with Nyasa by the Shire River.

From 9 A.M. to 3 P.M., except for a forty-minute interval for lunch, I supervised digging beneath collapsed huts or under the many piles of vegetable debris in the native plots. Conditions appeared ideal, yet in six hours all we got — apart from an epauletted bat and a monitor lizard shot among the bananas — were three dozen skinks (*Riopa sundevallii*), a snake-eyed skink (*Ablepharus wahlbergii*) and two young house-snakes (*Boaedon l. lineatus*).

MTIMBUKA (TEMBUKA), LAKE NYASA. 14°18′ S., 35°08′ E. Alt. 1550 feet.
Arrived on afternoon of February 3, and left by lorry on March 7th.

Through the kindness of Dr. W. A. Lamborn, the medical ento-

mologist, I was privileged to occupy his house on the lake shore from which it is separated by about 30 feet of lawn. Mtimbuka is on the west side of the lake 13 miles north of Fort Johnston where temperatures ranged from 63.4° to 92.8° during our stay. The only heavy rainstorm occurred on February 4, when 1.10 inches was officially recorded at Fort Johnston. Though showers fell on 12 other days, in no instance did the precipitation exceed half an inch and the total for the 32 days was only 2.81 inches.

Rain sank quickly into the sandy ground, of which so much of the flat country surrounding Mtimbuka consisted, but was absorbed more slowly by the areas of black cotton soil where there was a tendency for marshes to form. It seems likely that these flats were formerly beneath the waters of the Lake, which is still the third largest in Africa. Apart from seasonal variations of from 3 to 6 feet due to rainfall and evaporation, there is an 11-year cycle correlated with sunspots, the water-level being highest when sunspots are most numerous and at its lowest when they are fewest.

At the water's edge were frequently extensive reedbeds or luxurious growths of sedges that sometimes covered acres; elsewhere areas of bramble and scrubby growth with here and there a great baobab. Considerable stands of wild palms (*Hyphaene*) grew from the black cotton soil but as one proceeded inland, apart from native clearings planted with maize or millet, much of the country is clothed in dense thicket growth or scattered, often stunted, xerophytic trees that extend back to the low rocky hills on the horizon.

This combination of lake and savanna environment was faithfully reflected by the 14 species of frogs and 34 of reptiles (of which 16 were snakes) taken at Mtimbuka. Mtimbuka itself does not figure in zoological literature though a few vertebrates have been described from Fort Johnston (Lesumbwe). Lake Nyasa, however, is type locality for two species of snakes (*Mehelya nyassae* and *Aparallactus guentheri*), of which we got the former. A race of gecko (*Pachydactylus c. shaughaessyi*), that I searched for in vain, also had Lake Nyasa as type locality. Subsequently (at the British Museum) I learned that one of the gecko types was from Cape Maclear from whence came several early records of reptiles which I did not encounter during the entire trip. I have since regretted that I did not visit Cape Maclear, which can be reached by boat from Monkey Bay — about forty miles north of where I was.

There was astonishingly little wild life to be seen in the savanna

at the time (February) I was there. Of the 16 species of mammals we collected, 6 were bats. These were taken as they darted to and fro along the veranda, being attracted by the clouds of lake flies which nightly swarmed about my uncurtained window in which stood a bright acetylene lamp. Lake Nyasa is type locality for at least 21 species of mollusks, a good many of which we were successful in securing.

CHOLO MOUNTAIN FOREST, CHOLO. 16°06′ S., 35°03′ E. Alt. 4000 feet.

Arrived March 9, and left by lorry on the 28th.

The Vernay Expedition camped here from September 18 to October 1, 1946, and two and a half years later I pitched our tents on the same site. This was just below the forest which, at this point, commences about 3600 feet and continues upwards almost to the 5000-foot summit. The site was reached by a dirt track that passes through Miangi Tea Estate.

According to the rain gauges on the Estate, during our stay rain fell on 14 days with a total precipitation of 8.2 inches, but this was in the foothills and it was undoubtedly heavier up the mountain. Though 2.18, 1.62, and 1.30 inches respectively, fell on three days, amphibians were not aroused to any appreciable extent by the downpours as the latter were invariably accompanied by a drop in temperature. Minimum temperatures at Miangi ranged from 61° (on the 26th) to 72° (11th), the maximum being 70° (15th) to 90° (11th); all unique extremes.

In the Forest Reserve are many fine trees though few have a diameter exceeding 18 inches. It is possible to walk with comfort between the great stems in the less disturbed sections. Fig and *Dracaena* appear to be the principal species, with a tendency to be smothered by epiphytic growths that provide good cover for timid monkeys. At the time of our visit the deforested slopes below 3500 feet supported a well-nigh impenetrable growth of tall grass interspersed with clumps of bushes and widely scattered umbrella acacias. The undulating foothills support extensive plantations of tea, whose flat-topped trees apparently provide congenial basking places for snakes, especially the Cape Vine-Snake (*Thelotornis k. capensis*), as it was the tea-pickers who brought in most of the 14 species of snakes we preserved at Cholo. None was encountered *within* the forest; indeed, with the possible exception of *Typhlops t. obtusus* and a *Brookesia* taken by Mitchell, none of the 36 reptiles known from Cholo is exclusively a forest form.

Of the 13 amphibia only *Scolecomorphus k. kirkii, Rana o. gribinguiensis, Arthroleptis boulengeri* and *A. s. whytii,* might be regarded as

chiefly sylvicoline. A pair of sedge-frogs (*Hyperolius p. cholocnsis*) became the types of a new form, and a new race of the water-snake (*Lycodonomorphus whytii*) was first procured from a small affluent of the Nswadzi Stream that flows at the foot of the mountain.

Buccanodon belcheri, *Alethe c. cholocnsis* and *Uranomys woodi*, all have Cholo as their type locality but I failed to find them. Of the 20 species of mammals we did collect, only 4 were essentially inhabitants of primary forest.

MAGOMBE ESTATE, CHOLO DISTRICT. 16°07′ S., 35°10′ E. Alt. 3200 feet.
Arrived late in the afternoon of March 28, and left by lorry on the 29th.

In pouring rain we left our forest camp and drove down to Magombe Estate where I was the guest of Mr. and Mrs. A. R. Westrop, both of whom are deeply interested in natural history. It was at Magombe that Mr. Rodney C. Wood made the extensive collection of mammals that formed the basis of a report by the late P. S. Kershaw (1922, Ann. Mag. Nat. Hist. (9), 10, pp. 177–192) of the British Museum.

The little collecting we were able to accomplish in the short time at our disposal was confined to frogs and a snake.

RUO AND LUJERI RIVERS, MLANJE MOUNTAIN. 16°6′ S., 35°39′ E. Alt. 2350 ft.
Arrived March 29, and left by truck on April 11th.

Minimum temperatures, not quite complete, taken at Lujeri Estate during my stay, ranged from 60° to 67°, the maximum from 69° to 84°. Rain fell on 7 days with a total precipitation of 18.60 inches. Of this total 15.18 inches fell in the three day period of April 4 to 6, southeast Mlanje having the greatest rainfall in Nyasaland with about 120 inches per annum occurring on Lujeri Estate, still heavier in the forested Gorge.

As camping under such conditions might prove unpleasant, C. J. Ramsden Esq., manager of the 80,000 acre Lujeri Tea Estate, kindly placed at my disposal one of the company's houses nearest to the Gorge and scarcely a stone's throw from the gallery forest fringing the Ruo. Daily, when it was not raining, we drove up the Ruo Valley between miles of well-tended tea bushes, rich green against a background of bright red laterite soil. Eventually the narrow road, leaving all cultivation behind, became a rough track winding through dense woodland. Then we entered a gloomy clearing in which the Lujeri Estate power station was surrounded by magnificent trees. This was as far as a car might go and the only place in miles where one could be turned around. So leaving the lorry, we began to climb the path that continues all the way to the Ruo Falls at the very head of the

valley. As we toiled upwards through much beautiful, but surprisingly lifeless, evergreen forest, far below to our right we could hear the Ruo River roaring among the rocks.

Lovely as this forest is, never once did I see a monkey, mouse or squirrel along the miles covered by our several walks to and from the Falls. Possibly, with ten feet of water falling upon it annually, the Ruo Forest is too often overcast and dripping to be appreciated by animal life, for even birds were surprisingly scarce. All four kinds of mammals obtained during the week were savanna species, but as this was to be my last "camp", I had already decided to concentrate on reptiles and amphibians.

A large frog that I encountered near the foot of the Falls one day was so certainly new that I stopped to collect 30 of them which I subsequently described as *Arthroleptis a. francei*, a southeastern race of the equatorial *A. a. adolfifriederici* inhabiting the Kivu and Usambara forests. Though I returned to secure more, so elusive are the factors governing their appearance that we never again found any. Apparently sunshine, accompanied by a relatively high temperature, following a brief rainstorm, provided the approved conditions.

Descending the path one day, I caught sight of a lizard slipping between the rough-hewed planks that composed a shaky, sixty-foot suspension bridge thrown across a ravine. Clearly the lizard had been basking where a shaft of sunlight fell upon the planks. That was the first glimpse I had of a flat-lizard of which we later collected a score, mostly on one sunny morning on rocks in the power station clearing. This new species (*Platysaurus mitchelli*) was the most interesting reptile I collected during the entire trip.

It was on this same path, though nearer the Falls, that Dr. A. F. Carr collected the three pygmy chameleons which were named *Brookesia p. carri*. The type and paratype of *Lycodonomorphus r. nlanjensis*, a new race of water-snake, were taken lower down the valley near the house. I might add that, together with my headman and a couple of boys, we overturned every tree or log of suitable size lying in the forest along either side of the trail. By doing so, and searching beneath, we acquired many nice snails, slugs, sow bugs, millipedes and other invertebrates, but did not see a single snake or frog.

CHIKWAWA, SHIRE RIVER. 16°03′ S., 34°49′ E. Alt. 400 feet.

On April 18th B. L. Mitchell, Esq., of the Tsetse Control Depart-

ment, kindly drove me down from Blantyre for a last day's collecting at an altitude lower than any I had been in, except at Kasumbadedza. The Vernay Expedition stayed at Chikwawa from October 1 to 7, 1946.

After the highlands, Chikwawa District seemed hot and dry, the fissured ground hardened by a baking sun. In some areas tall termitaria were quite a feature of the landscape. Sedges grew prolifically in and along the banks of the broad Shire; the extensive flats on either side were covered with rank grass. Clumps of bananas near the river provided some of the frogs of which we had come in search. Thorn-scrub, a few stunted trees, acacia, euphorbia, and a distant baobab or palm, made their contribution to this habitat.

ACKNOWLEDGEMENTS

Owing to gasoline shortages, and the near-famine conditions prevailing towards the end of my stay, much of the foregoing itinerary could not have been carried out but for the generous help and many courtesies extended to us by the Government of Nyasaland. For this I should like to thank His Excellency the Governor, and various departmental heads including Game, Forestry, Agriculture, Customs and Public Works.

Mr. W. J. Rangeley, currently Provincial Commissioner of the Southern Province and himself keenly interested in zoology, was especially helpful, as also C. D. P. T. Haskard, Esq., then District Commissioner of Chiradzulu. In the Northern Province we had the benefit of the advice of the Acting Provincial Commissioner Mr. C. W. Benson, whose knowledge of Nyasaland birds is unrivalled. Mr. B. L. Mitchell of the Game Department, one of the few who are interested in the country's reptiles, kindly supplied us with lists of the species he had encountered. The friendly assistance of Major D. N. Smalley of the Agricultural Department made it possible for us to ascend the Nyika with a minimum of delay.

Rodney Wood, Nyasaland's veteran naturalist, supplied me with much useful information prior to our arrival in the country, and his friend Mr. A. R. Westrop of Cholo generously lent us his cottage on Mlanje Plateau. Similarly Dr. W. A. Lamborn, retired medical entomologist at Fort Johnston, placed his house on the lakeshore at my disposal, and J. F. Ramsden Esq., a house on Lujeri Estate beside the Ruo River. Indeed, the friendly residents of Nyasaland

accorded us so much assistance that it is quite impossible to mention them all by name, but I take this opportunity of offering my grateful thanks.

During my stay in Mozambique no one could have been more helpful than His Excellency Senhor Policarpo de Souza Santos and his staff. Not only did they facilitate my entrance by minimizing formalities, but rendered my stay in Tete District a very pleasant memory.

I am also indebted to the American Philosophical Society whose grant-in-aid made this expedition possible. The American Geographical Society and Dr. and Mrs. Richard Light have been most kind in allowing me to use the excellent aerial photographs on plates 2, 3, 4 and 6, which reveal so clearly the type of terrain in which we operated. Thanks go to my wife Mary for the photographs on plate 5, and to her sister, Miss Hilda Sloan, who, during the first part of the trip, so skilfully drove the four-ton truck over 2000 miles of rough roads, that there was not a single accident. Also to them both for photographs illustrating earlier reports in this series, and for much help with the collecting, particularly of mollusks on which it is hoped a report will be published in due course. A report on the earthworms is being written by Dr. A. J. Cain.

And lastly, but by no means least, I should like to thank Miss Nelda Wright for her painstaking editing of these series of reports, with consequent elimination of many errors.

CONCLUSIONS

Under no circumstances can Nyasaland be considered a zoological entity; the Protectorate is merely a fortuitous political creation resulting from conditions obtaining in 1859. The fauna of its lowland swamps and savanna is homogeneous with that of similar contiguous areas in the surrounding countries of Tanganyika, Northern Rhodesia, and Mozambique. The few endemic forms peculiar to Nyasaland are chiefly races of species occurring beyond its borders, the few whose status is at present that of full species will, in some instances, be linked with others in nearby countries. As might be expected, the animals inhabiting Nyasaland's higher mountains show relationship with forms occurring at high altitudes both to the north and to the south.

For comparative purposes I have reproduced on the accompanying

charts the records of races obtained on the three nearest mountain groups lying to the northeast, north, and northwest of Lake Nyasa, but across the border in southern Tanganyika Territory. Still other mountains will be found charted in my (Loveridge, 1933) report on the zoogeography of the Southwestern Highlands of Tanganyika.

Amphibians associated with montane meadows or *primary forests	Uzungwe Mountains	Ukinga & Ubena M.	Rungwe Mountain	Misuku Mountains	Nyika Plateau	Nchisi Mountain	Zomba Plateau	Cholo Mountain	Mlanje Mountain
Bufo taitanus uzunguensis	L	L							
Bufo taitanus nyikae					L				
Hyperolius marginatus	L	L	L		L				
Hyperolius puncticulatus puncticulatus			L	L	?				
Hyperolius puncticulatus choloensis								L	
Rana fuscigula angolensis	L	L	L	L	L	L	L	L	L
Rana mascareniensis uzungwensis	L	L							L
Rana ansorgii (occurs on Chiradzulu)									L
Rana fasciata fülleborni	L	L			L		M		L
**Rana oxyrhynchus gribinguiensis*				L	L	L		L	
Phrynobatrachus ukingensis mababiensis	L	L				L			
**Phrynobatrachus ukingensis ukingensis*		L	L	L					
Phrynobatrachus ukingensis nyikae					L				
**Arthroleptis xenodactyloides nkukae*	L	L	L						
**Arthroleptis xenodactyloides nyikae*					L				
**Arthroleptis boulengeri* (? det.)				L		L	L	L	L
**Arthroleptis reichei*	L	L	L	L					
**Arthroleptis adolfifriedcrici francei*									L
**Arthroleptis stenodactylus whytii*			L	L		L		L	L
**Scolecomorphus kirkii kirkii*		L					V	L	
*Total number of primary forest forms	2	4	4	5	2	3	2	4	3

L = Loveridge collected
M = Mitchell collected
V = Vernay Expedition collected

All the montane meadow frogs on the foregoing list have, with the exception of *Hyperolius marginatus*, lowland representatives. Even the small *Bufo taitanus* of the Teita Mountains in Kenya has a form *B. t. beirae* on the coastal plain away to the south. *Rana fasciata*, though exclusively montane in East Africa where, as *R. f. merumontana*, it ranges northwards to the Usambaras and Meru Mountain, is found at lower altitudes in the cooler climate of South Africa.

The only sylvicoline frogs common to both Rungwe and the Misukus are ranids with more or less well-developed digital disks, viz. *Phrynobatrachus u. ukingensis*, *Arthroleptis reichei* and *A. stenodactylus whytii*. The last mentioned (described from the Misukus by Boulenger), apparently occurring on every forested mountain from the Usambaras to Selinda Mountain in Southern Rhodesia, presents something of a problem. From its correspondingly wide-ranging lowland representative (*A. s. stenodactylus*) it differs only in having digits that terminate in disks, and on its heel a shovel-shaped metatarsal tubercle that is blunter — though adequate enough to enable its owner to bury in the softer loam or leaf mold of a primary forest. Is it possible that whenever *A. s. stenodactylus*, which inhabits the more arid lowlands, moves up to, and settles in, rain forest, that the new environment has the effect of developing disks and blunting the tubercle within a few generations? The possibility is suggested by the variability of the extensive material of both forms that is now assembled in the Museum of Comparative Zoology.

While our findings establish the close affinity of the amphibian forest faunae of Rungwe and the Misukus, there is one tiny click-frog (*Arthroleptis xenodactyloides*) I failed to find in the Misukus (though doubtless it is there), which has a representative on Rungwe, and a slightly different race in the Nyika forests to the southeast of the Misuku Mountains. The evidence seems to point to long separation of the Nyika, whose 900 square miles of undulating plateau supports a non-sylvicoline fauna strikingly reminiscent of that occurring in the Uzungwe upland meadows, though occasionally subspecifically distinct as in the case of the *Bufo*. *Arthroleptis boulengeri* was described from a single example taken in the southeast Belgian Congo and whether the frogs assigned to it here are really that species requires confirmation. The typical form of *Arthroleptis adolfifriederici* was described from Rugege Forest in the Kivu Volcanoes, ranges eastward to the Usambaras and southeast to the Porotos near Rungwe. A gap of about 700 miles separates Rungwe from Mlanje whence comes the

Reptiles associated with montane meadows or *primary forests	Uzungwe Mountains	Ukinga & Ubena M.	Rungwe Mountain	Misuku Mountains	Nyika Plateau	Nchisi Mountain	Zomba Plateau	Cholo and/or Chiradzulu	Mlanje Mountain
**Lygodactylus angularis angularis*		L	L	L		L	L	L	L
Chamaeleo goetzei goetzei	L	L	L						
Chamaeleo goetzei nyikae					L				
**Brookesia nchisiensis*		L	L	L		L			
**Brookesia brachyura brachyura*							J	M	
**Brookesia platyceps platyceps*									R
**Brookesia platyceps carri*									V
Mabuya bocagii mlanjensis									L
Mabuya hildae					L				
Mabuya varia nyikae (*varia* on all rest)					L				
**Melanoseps ater uzungwensis*	L								
**Melanoseps ater misukuensis*				L					
**Melanoseps ater ater* (also on Vipya)				L					
**Holaspis guentheri laevis*							J		L
**Typhlops tettensis obtusus*								L	L
**Lycodonomorphus rufulus whytii* (stream)			B						
**Lycodonomorphus rufulus mlanjensis* (")								L	L
Pseudaspis cana		L					J	J	
Duberria lutrix shiranum	L	L	L		L		L		V
Psammophylax trimerorhinus variabilis	L	L	L		L		L		L
**Crotaphopeltis hotamboeia tornieri*	L	L	L	L					
**Elapsoidea sundevalli decosteri*									V
**Naja melanoleuca*				L					V
**Atheris nitschei rungweensis*			B	L					
*Total number of primary forest forms	2	3	4	8	0	2	2	4	8

B = Boulton collected
J = Johnston collected
L = Loveridge collected
M = Mitchell collected
R = Ramsden collected
V = Vernay Expedition &/or Carr collected

new form *A. a. francei.*

A similar case of discontinuous distribution is furnished by the limbless caecilian (*Scolecomorphus k. uluguruensis*), so abundant in the cloud forests of the Uluguru Mountains of central Tanganyika. A single example of its southern representative (*S. k. kirkii*) was unearthed, after rain, in the deforested uplands of the Ubena Highlands in southern Tanganyika. Were drought conditions the reason why we encountered none in the Misuku, Nyika, Vipya, or Nchisi Mountains? For *S. k. kirkii* occurs again on Zomba Plateau, Blantyre, and Cholo Mountain where, following heavy downpours, many of these wormlike creatures came to the surface and were captured. From Ubena to Zomba, in a straight line down Lake Nyasa, the distance is about 450 miles.

Among reptiles no difficulty arises in deciding which are montane meadow forms more or less isolated at 6000 feet or over. Three of the seven species listed are skinks (*Mabuya*) at present known only from single mountains. *M. b. mlanjensis* is related to an Angolan species; there are some grounds for thinking that *M. hildae* may be only subspecifically differentiated from a rare Ukinga Mountain skink, while *M. v. nyikae* is a montane representative of the widespread lowland *M. v. varia* which occurs as high as 6000 feet on Mlanje's Lichenya Plateau. Of the three snakes one, *Pseudaspis cana*, often lowland in South Africa, occurs unchanged in the upland zones of tropical East Africa all the way to Mount Kenya. The other two species, described from Nyasaland Mountains by Günther, have since been found on the uplands of southern Tanganyika, but further north both are replaced by other montane races ranging into the mountains of Ethipoia. In temperate South Africa, *Duberria l. lutrix* may be found at low altitudes, as also the typical *Psammophylax t. tritaeniatus* whose range extends through the hot lowlands of Nyasaland (we met with it on Nchisi) to southeastern Tanganyika Territory.

When it comes to deciding what species of reptiles are exclusively primary forest forms we face difficulties for, following deforestation, some arboreal species (e.g. *Lygodactylus a. angularis*) exhibit considerable adaptability. On Chiradzulu, for example, this gecko suns on the walls and sleeps in the thatch of the District Commissioner's house. Others like *Brookesia*, *Melanoseps* and *Typhlops t. obtusus* seem to thrive just as well under the humid conditions provided by riverine gallery forest in the plains as ever they did in their mountain habitat. The arboreal lacertid *Holaspis g. laevis*, described from the Usambara

Mountains, has been reported by Major C. J. P. Ionides as occurring on typical savanna trees in southeastern Tanganyika. Definitely a primary forest form, our Nyasaland specimen was taken on a roadside tree near the Ruo River at the foot of Mlanje Mountain; not one was seen on the mountain itself.

The two *Lycodonomorphus* snakes belong to a genus that in East Africa occurs only in mountain streams; as these so frequently issue from the montane forests, *Lycodonomorphus* is listed, though admittedly an aquatic rather than a sylvicoline form. More interesting because neither of them have been taken in Nyasaland before, and one represents a genus new to the Protectorate, were *Crotaphopeltis h. tornieri* and *Atheris n. rungwecnsis* which now reach their most southerly recorded limits in the Misukus. *Brookesia nchisiensis,* on the other hand, continues southwards to Nchisi Mountain where there is an apparent break with the sylvicoline fauna of the more southerly mountains where *platyceps* is the undoubted representative of *nchisiensis.*

Attention should be drawn to the fact that this difference between the forest forms, with the exception of *Lygodactylus,* does not apply to the montane meadow snakes which, undifferentiated, range all the way from the Uzungwe south to Mlanje, an airline distance of 500 miles.

Sylvicoline mammals, being warm-blooded are better able to withstand climatic changes than the poikilothermous vertebrates. Consequently, mammal ranges often extend from the montane forests along the forest-fringed rivers that go tumbling down to the plains to merge with streams from other mountains. This appears especially true of monkeys like *Cercopithecus mitis,* the thick pelts of whose many montane forms give way to sparser fur in the race established on the coastal plain. Though *C. mitis moloneyi* allegedly came from Karonga on the lake shore, it will be noted that it was based on a skin obtained from native hunters by Whyte when he was at Karonga. Mr. C. W. Benson, formerly District Commissioner at Karonga, informs me (12 vi. 53) that he has no evidence of blue monkey occurring in the Karonga Lake littoral, but suggests it may be present along the lower Songwe River. There seems a distinct possibility therefore that the type was killed on the nearby Nyika Mountains from whose Mount Waller came the type of *francescae,* now regarded as a synonym of *C. m. moloneyi.* In passing, it might be pointed out that *C. mitis,* like the elephant shrew *Rhynchocyon cirnei,* has a different subspecies

Mammals associated with primary forests	Uzungwe Mountains	Ukinga & Ubena M.	Rungwe Mountain	Misuku Mountains	Nyika Plateau	Vipya or Nchisi M.	Zomba Plateau	Cholo and/or Chiradzulu	Mlanje Mountain
Rhynchocyon cirnei hendersoni	L		L	L	*L	L			
Rhynchocyon cirnei cirnei								K	L
Sylvisorex sorella sorella				*L					
Chlorotalpa stuhlmanni	L	L	L						
Nandinia binotata gerrardi		L	L	L					
Cercopithecus mitis moloneyi	L	L	L	L	S				
Cercopithecus mitis nyasae								L	*L
Colobus polykomos sharpei	S	L	S						
Aethosciurus byatti laetus		*L							
Aethosciurus lucifer			L	*L					
Claviglis murinus isolatus	L								
Claviglis murinus collaris		L							
Claviglis nanus				L		L			
Claviglis johnstoni				L			*L		
Dendromus mesomelas nyasae	L	L	L	L	*L				
Dendromus whytei whytei				Nr*	L	L		L	L
Praomys jacksoni melanonotus	L	L	L						
Praomys jacksoni delectorum				L					*L
Hylomyscus carillus weileri	L	L							
Cricetomys gambianus viator		?	L					L	
Cephalophus harveyi harveyi		R			L				
Cephalophus caeruleus lugens		S	L						
Cephalophus caeruleus nyasae					S	S			S
Dendrohyrax arborcus mimus				Nr*					
Total forest forms	8	12	10	11	6	4	1	4	5

K = Kershaw recorded
L = Loveridge collected
S = Seen by Loveridge
* = Type Locality
Nr* = Near Type Locality

on Cholo and Mlanje, suggesting long separation from the mountains of the northern group.

On the other hand, as a genus the *Colobus* monkey reaches its southeastern limit on Rungwe, despite the fact that Whyte obtained the type skin across the border at Fort Hill (5000 feet), which is only ten miles or so from the denuded slopes of the Misukus. We have no evidence that its range formerly extended to the Misukus though it might have been expected to do so in common with that of the squirrel *Acthosciurus lucifer*. Instead, the distribution of *Colobus* appears to parallel that of the elusive mole *Chlorotalpa*, of whose workings I saw no sign in the Misukus though it may well be surviving on some forested mountain top.

Members of the genus *Chlorotalpa* occur from the Knysna forests of South Africa to the mountains of the Uluguru, Elgon and Ruwenzori in Central Africa. The eight races of *Sylvisorex sorella* extend northwards in the east to the Ethiopian highlands, westward to the forests of Angola and the Cameroons. *Rhynchocyon c. cirnei*, first discovered at Quelimane in Mozambique, is apparently adapted to dry forest at low altitudes for we met with it among the foothills (Likabula River) of the Mlanje Massif, not on the plateau itself.

The tree civet (*Nandinia b. gerrardi*) came from the gallery forests of the Lower Shire, but other races have been described from forested areas as far north as Kaimosi, near Elgon, and the typical form from Fernando Po off the West Coast.

Like so many rodents, the dormice (*Claviglis*, regarded as only a subgenus of *Graphiurus* by some) are adaptable and can for some time survive extensive forest destruction. *C. s. collaris* should almost certainly be regarded as just another race of the South African *murinus*, but the entire genus is so much in need of revisionary study that speculations regarding distribution appear futile. It is not unusual for several species of *Dendromus* to occur in the same locality, but the two tree mice recorded here are representatives of two subgenera and quite distinct. A third species (related to *whytei*) has been described from the Nyika Plateau but was not encountered there on this occasion though it has been taken by me on Ukerewe Island in Lake Victoria where there is relatively little surviving forest.

Surprisingly enough, Miss Lawrence finds the Poroto Soft-furred Rat (*Praomys jacksoni melanonotus*) is replaced in the Misuku Mountains by the Mlanje race *delectorum*, so that it should be looked for in all the intervening montane forests. It would appear that the

Climbing Rat (*Hylomyscus*) of the Kivu volcanoes stops short on the Ukinga, but its arboreal habits (cf. Allen & Loveridge, 1933, Bull. Mus. Comp. Zool., **75**, p. 109) are such as to make it easily overlooked. Search should be made for it in tree tops of the Matipa Forest on the Misukus. I have always considered the Giant Rats (*Cricetomys*) as sylvicoline and the only one taken in the course of the present trip was trapped right inside Cholo Forest. This classification is not precluded by the fact that *Cricetomys* is also a streamside dweller, for gallery forest is usually present in its habitat. Doubtless a single race (*C. gambianus viator*) ranges all the way to the Ukinga Mountains, but is replaced in the Ulugurus by *C. g. osgoodi*.

The range of Harvey's Duiker (*Cephalophus h. harveyi*) is still more extensive as it continues northwards all the way to Kilimanjaro and is doubtless present in all large stands of primary forest in Nyasaland. The timid and elusive Usangu Blue Duiker (*C. caeruleus lugens*), on the other hand, has a southern race on Mlanje, but where the break occurs between the two forms I do not know for all my records were sight or sound.

If the foregoing lists emphasize anything, it is the extreme sketchiness of our data. Merely because one failed to find a particular species during three weeks — which was the average time spent on each mountain — does not justify one in assuming that the species in question is not to be found there. A more thorough search is needed and that at different seasons of the year in the case of cold-blooded creatures.

With the lists indicating what gaps require filling in, I would suggest to any resident naturalist in Nyasaland that he select a different mountain for local leave each year and experience the exhilaration of filling in the gaps in our knowledge while there is still time to do so.

At my request Mr. C. W. Benson, the acknowledged authority on Nyasaland birdlife, kindly consented to contribute the accompanying Appendix on the Avifauna associated with Montane Rain Forests in the general region under consideration.

APPENDIX
on the
AVIFAUNA ASSOCIATED WITH MONTANE RAIN FORESTS
By C. W. Benson

The nine areas selected for the accompanying list have been chosen as those of greater importance in Nyasaland or adjacent territory.

A capital letter in the relevant column for the area indicates that the form in question has been recorded from there in one of the following sources:

B = Benson, C. W., "A Check List of the Birds of Nyasaland (including data on ecology and breeding seasons)," to be published about August 1953 as a special issue of the Nyasaland Journal, or (in the case of Unangu, Mozambique), in Ibis, 1946: 240–241.

L = Loveridge, A., 1933, Bull, Mus. Comp. Zool., **75**, 1: 35–37, or Bangs and Loveridge, Bull. Mus. Comp. Zool., **75**, 3: 143–221.

V = Vincent, J., 1934, Ibis: 159–160.

It should be understood that some of the forms listed are by no means confined to rain forest. Thus *Pycnonotus xanthopygos layardi* occurs at the forest edge, but also in a variety of habitats throughout Nyasaland. There are doubtless a number of occurrences of forms of this type still to be added to the list. It is natural that collectors should concentrate on specialised forest forms, to the neglect of those of more general distribution. One species of the forest proper which could doubtless be added to the list is *Francolinus squamatus*, known from the Vipya Plateau, Nyasaland (race *F. s. doni*) and the Uzungwe Mountains, Tanganyika Territory (race *F. s. uzungwensis*, see Loveridge, *op. cit.*).

Forms inhabiting secondary bracken-briar growth, replacing primary forest after its destruction, are not included. Details of altitudinal distribution and ecological preference (*i.e.*, whether feeding in the canopy, mid-stratum, ground-stratum or edges of the forest), are given in my Check List (*loc. cit. supra*).

Some differences of nomenclature from the original records for Rungwe, Unangu and Namuli will be noted. These are in accordance with subsequent taxonomic research, embodied in my Check List. I also prefer Masuku for the mountains called Misuku by Loveridge.

Avifauna associated with Montane rain forests	Rungwe	Masuku	Nyika	Unangu	Nchisi	Mangoche	Namuli	Cholo	Mlanje
Stephanoaëtus coronatus	L		B				V		B
Accipiter melanoleucus melanoleucus							V	B	
Accipiter tachiro tachiro			B		B			B	B
Columba arquatrix arquatrix	L		B	B	B			B	B
Turturoena delegorguei sharpei								B	
Turtur tympanistria			B		B	B	V	B	B
Aplopelia larvata larvata	L	B	B		B	B	V	B	B
Cuculus solitarius		B	B		B	B		B	B
Chrysococcyx cupreus cupreus					B	B		B	B
Tauraco livingstonii livingstonii	L			B		B	V	B	B
Tauraco schalowi marungensis		B	B		B				
Bycanistes bucinator					B	B			
Bycanistes brevis	L	B						B	B
Tockus alboterminatus geloensis		B	B						
Tockus alboterminatus alboterminatus					B	B	V	B	B
Ciccaba woodfordii woodfordii		B	B		B	B	V	B	B
Caprimulgus poliocephalus guttifer		B	B						
Apaloderma narina narina					B			B	B
Heterotrogon vittatum vittatum	L	B	B		B		V	B	B
Buccanodon leucotis leucotis								B	B
Buccanodon olivaceum rungweensis	L	B							
Buccanodon olivaceum belcheri							V	B	
Viridibucco simplex						B			
Viridibucco leucomystax		B	B		B				
Pogoniulius bilineatus bilineatus							V	B	B
Indicator variegatus							V		B
Indicator minor minor					B		V		
Indicator exilis meliphilus								B	B
Prodotiscus insignis zambesiae					B		V	B	B
Campethera caillautii fülleborni								V	
Campethera abingoni abingoni								B	
Dendropicos fuscescens camacupae						B	V		
Mesopicos griseocephalus ruwenzori		B	B						
Smithornis capensis capensis					B			B	B
Pseudoalcippe abyssinicus stierlingi	L								
Pseudoalcippe abyssinicus stictigula			B	B		B			

	Rungwe	Masuku	Nyika	Unangu	Nchisi	Mangoche	Namuli	Cholo	Mlanje
Illadopsis pyrrhopterus nyasae			B						
Illadopsis stictigula pressa	L	B							
Pycnonotus xanthopygos layardi		B	B		B	B	V	B	B
Phyllastrephus flavostriatus alfredi			B		B				
Phyllastrephus flavostriatus vincenti							V	B	B
Phyllastrephus fischeri placidus	L	B	B	B	B	B	V	B	B
Phyllastrephus orostruthus orostruthus							V		
Phyllastrephus cerviniventris					B	B			
Arizelocichla tephrolaema fusciceps	L		B				V		B
Arizelocichla milanjensis striifacies	L	B	B	B	B	B		B	
Arizelocichla milanjensis milanjensis							V		B
Arizelocichla masukuensis masukuensis	L	B							
Eurillas virens zombensis	L	B				B	V	B	B
Alseonax adustus subadustus	L		B		B	B	V	B	B
Alseonax cinereus cinereola					B	B		B	B
Dioptrornis chocolatinus nyikensis	L	B	B						
Batis capensis mixta	L	B							
Batis capensis dimorpha			B		B		V	B	B
Platysteira peltata peltata					B	B			B
Trochocercus cyanomelas bivittatus									B
Trochocercus albonotatus albonotatus	L	B	B	B		B	V	B	B
Terpsiphone viridis violacea					B				
Turdus olivaceus nyikae	L		B						
Turdus olivaceus milanjensis							V	B	B
Turdus gurneyi usambarae		B	B						
Turdus gurneyi gurneyi					B	B	V	B	B
Turdus fischeri belcheri								B	
Cossypha heuglini heuglini					B	B			B
Cossypha natalensis					B	B		B	B
Alethe choloensis choloensis						B		B	B
Alethe choloensis namuli							V		
Alethe fülleborni fülleborni	L	B	B						
Bessonornis anomala macclouniei	L		B						
Bessonornis anomala anomala									B
Bessonornis anomala gurue							V		
Sheppardia sharpei sharpei	L		B						
Pogonocichla stellata orientalis	L	B	B	B	B	B	V	B	B
Seicercus ruficapilla johnstoni	L	B	B		B	B	V	B	B

	Rungwe	Masuku	Nyika	Unangu	Nchisi	Mangoche	Namuli	Cholo	Mlanje
Sathrocercus mariae usambarae	L	B	B	B					
Sathrocercus mariae granti						B	V	B	B
Apalis thoracica murina	L	B							
Apalis thoracica youngi			B						
Apalis thoracica whitei					B				
Apalis thoracica lynesi							V		
Apalis thoracica flavigularis									B
Apalis cinerea brunneiceps	L	B							
Apalis melanocephala lightoni						B			
Apalis melanocephala tenebricosa				B			V		
Apalis melanocephala fuliginosa								B	B
Apalis canicceps neglecta					B			B	
Apalis chariessa								B	B
Apalis bamendae strausae	B								
Apalis bamendae bensoni		B	B		B				
Apalis moreaui sousae				B					
Artisornis metopias altus				B					
Camaroptera brachyura fuggles-couchmani		B							
Camaroptera brachyura bororensis					B	B		B	B
Campephaga sulphurata					B	B	V	B	
Coracina caesia pura	L							B	
Dicrurus ludwigii ludwigii	L						V	B	B
Laniarius aethiopicus major		B							
Laniarius aethiopicus mossambicus			B		B	B	V	B	B
Laniarius fülleborni		B	B						
Dryoscopus cubla hamatus		B	B		B	B		B	B
Chlorophoneus olivaceus bertrandi									B
Chlorophoneus nigrifrons manningi			B			B	V	B	B
Nicator chloris gularis								B	
Oriolus chlorocephalus chlorocephalus								B	
Onychognathus walleri walleri	L		B						
Onychognathus tenuirostris raymondi			B						
Zosterops senegalensis anderssoni					B	B			
Zosterops virens stierlingi	L	B	B				V	B	B
Cinnyris mediocris fülleborni	L	B							
Cinnyris mediocris bensoni			B	B			V		B
Cyanomitra olivacea alfredi					B	B	V	B	B

	Rungwe	Masuku	Nyika	Unangu	Nchisi	Mangoche	Namuli	Cholo	Mlanje
Anthreptes collaris zambesiana								B	B
Symplectes bicolor stictifrons						B	V	B	B
Othyphantes stuhlmanni nyikae			B						
Xanthoploceus bertrandi			B		B	B		B	B
Amauresthes fringilloides					B			B	
Cryptospiza reichenovii australis		B	B	B	B		V	B	B
Hypargos niveoguttatus						B			B
Mandingoa nitidula nitidula					B	B			B
Linurgus olivaceus kilimensis	L	B	B						

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PLATE 1

MAP SHOWING PRINCIPAL COLLECTING LOCALITIES

1948

Landing at Beira, Mozambique (17–19.vii), Loveridge proceeded by rail to Blantyre, Nyasaland (20–26.vii). Thence by truck to Likabula River (26.vii–6.viii) at foot of Mlanje Mtn., which was ascended to Lichenya Plateau (6–23.viii) with side trip to Chambe Plateau (20.viii). Thereafter Chiradzulu Mtn. (25.viii–1.ix); Zomba Plateau (1–13.ix); Dedza (13–14.ix); Kasungu Boma (14–15.ix); Mzimba Rest House (15–16.ix); Macdonald's Camp, Vipya Plateau (16–20.ix); Katumbi (20–21.ix); Chinunkha (21–22.ix); Matipa Forest, Misuku Mtns. (22.ix–18.x); Chinunkha (18–22.x); Chere River Bridge, Northern Rhodesia (22–23.x); Nchenachena (23–25.x); Nyika Plateau (27.x–19.xi); down to Nchenachena (19–23.xi); Mzimba (23–24.xi); Kasungu (24–25.xi); Nchisi Mtn. (25.xi–13.xii); Chitala River at Empire Cotton Growers' Experimental Station (13–21.xii) with side trips to Mpatanjoka near Salima (15.xii) and Mnema, Makanjila on Lake Nyasa (16.xii); Dedza (21–22.xii); Blantyre (22.xii–3.i.49) with side trips to Hynde Dam, Limbe (27.xii).

1949

Ndirandi Mtn. (1.i). On road to Tete, Mozambique (3–4.i), roadside near Micombo east of Tete (4–5.i); Kasumbadedza Village on south bank of Zambezi 5 miles west of Tete — listed and labeled as "near Tete" (5–31.i); roadside near Mpatamanga Gorge Bridge (31.i.); Blantyre (1.ii); Dally's Hotel, Chipoka, Lake Nyasa (2–3.ii); Mtimbuka as Tembuka on labels (3.ii–7.iii) with side trips to Chowe (12.ii) and Kausi Village, Lake Malombe (25.ii); Blantyre (7–9.iii); Cholo Mtn. (9–28.iii); Magombe Estate, Cholo (28–29.iii); Ruo & Lujeri Rivers, Mlanje Mtn. (29.iii–11.iv); Blantyre (11–20.iv) with side trips to Limbe (16–17.iv) and Shire River at Chikwawa (18.iv). Left Nyasaland by air (20.iv.49).

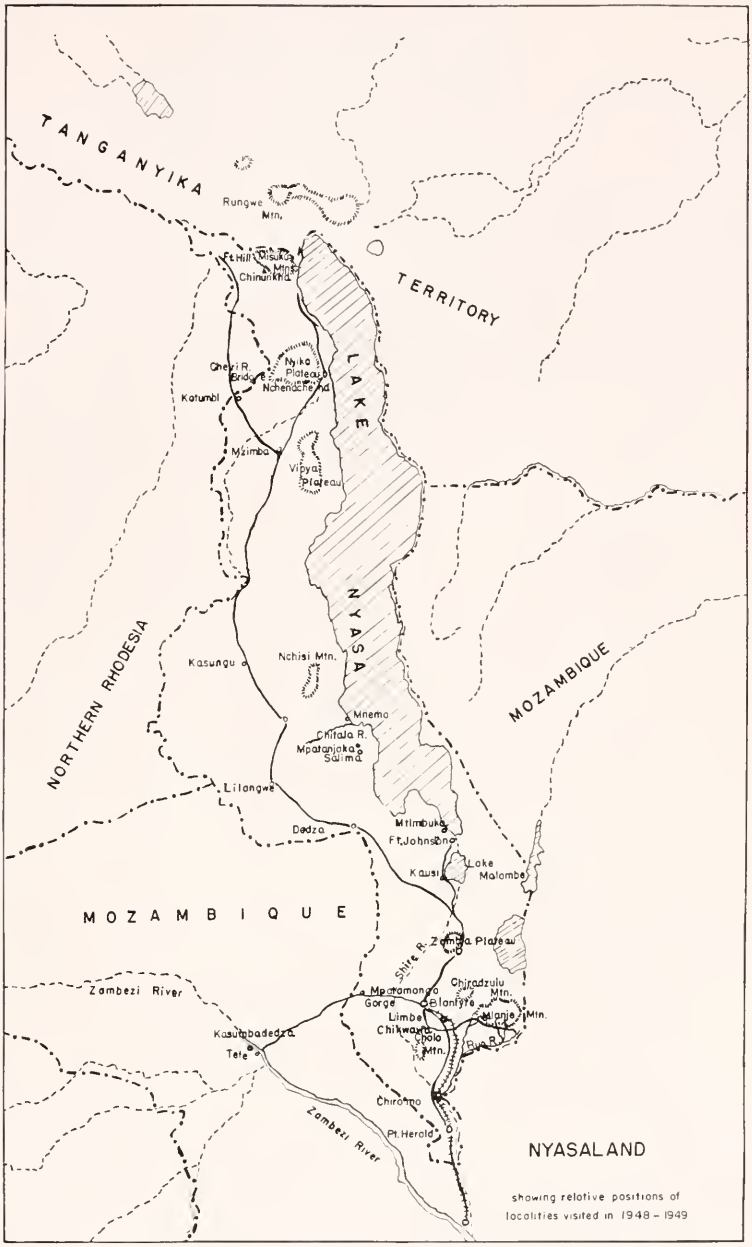
TANGANYIKA
TERRITORY
Rungwe Mtn.
Ft Hill
Misuku Mts
Chinunkhu
Ghezi R.
Bridge
Nyika Plateau
Nchenachena Rd
Katumbi
Mzimba
Vipya Plateau
LAKE NYASA
NORTHERN RHODESIA
Kasungu
Nchisi Mtn.
Mnema
Chifata R.
Mpatanjaka
Salima
MOZAMBIQUE
Lilongwe
Dedza
Mlimbuka
Ft Johnston
Kausi
Lake Malombe
MOZAMBIQUE
Shire R.
Zomba Plateau
Zambezi River
Mpatamanga Gorge
Chiradzulu Mtn.
Blantyre
Limbe
Chikwawa
Sholo Mtn.
Mlanje Mtn.
Ruo R.
Kasumbadezra
Tete
Chiromo
Zambezi River
Pt Herald
NYASALAND
showing relative positions of localities visited in 1948 – 1949

PLATE 1

PLATE 2

MLANJE MOUNTAIN WHOSE HIGHEST PEAK IS 9843 FEET

An aerial view, taken at 17,000 feet by Dr. Mary Light, showing LICHENYA PLATEAU on the extreme left and, in the centre, the gallery forest marking the courses of the LUJERI AND RUO RIVERS in front of the forested RUO GORGE. Mlanje is zoologically famous as the type locality of many birds and mammals; also, as "Shire Highlands, chiefly Milanji and Zomba," of several reptiles collected by Alexander Whyte, discoverer of the Mlanje Cypress (*Widdringtonia whytei*). Curiously enough the Vernay Expedition collected a tiny skink (*Scelotes arnoldi*) on the Lichenya Plateau which was known previously only from the type taken on Selinda Mountain, Southern Rhodesia, a distribution paralleling that of the cypress, reported from Melsetter and the nearby Chimanimani Mountains.

Photo courtesy of Dr. Mary Light.

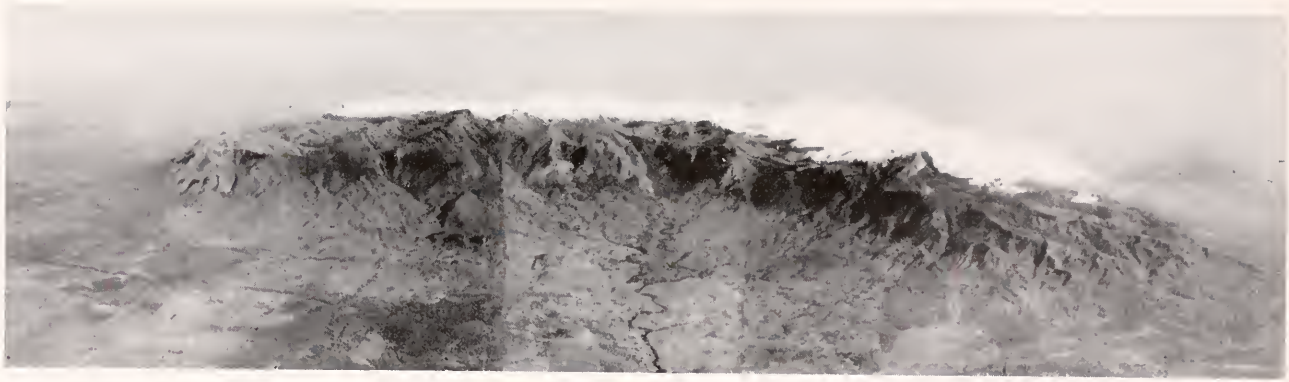

PLATE 2

PLATE 3

SOUTHWEST ASPECT OF MLANJE MOUNTAIN

This aerial view shows the LIKABULA RIVER VALLEY, 2100 feet (left), where the Expedition made its first camp; the LICHENYA PLATEAU, 6000 feet (centre), where they stayed for two weeks in August, the forested "crater" (right) from whose entrance the Lauderdale Tea Estate appears to be flowing. The common fat-mouse of the Likabula Valley proved to be an undescribed upland race (*Steatomys p. nyasae*) of the Tete *pratensis*. Lichenya Plateau furnished a new skink (*Mabuya mlanjensis*) and pygmy chameleon (*Brookesia b. carri*).

Photo courtesy of Dr. Mary Light.

PLATE 3

PLATE 4

THE LUJERI AND RUO RIVERS, MLANJE MOUNTAIN

The Lujeri Tea Plantation in the foreground, enjoys an annual rainfall of 120 inches, being situated between the forest-fringed Lujeri (left) and Ruo (right) rivers. The latter originates on the Plateau, descending via the Ruo Falls and Gorge to the plains where it joins the Shire and ultimately merges with the Zambezi. It was in the forested Ruo Gorge that the author secured a new frog and lizard during the last week of the *ulendo*, and a new snake farther down the valley where he occupied a house that was generously placed at his disposal by the Lujeri Estate.

Photo courtesy of Dr. Mary Light.

PLATE 4

PLATE 5

THE AUTHOR'S CAMP ON VIPYA PLATEAU AT 6000 FEET

The vast Vipya Plateau consists largely of rolling downs clothed in dry, waist-high grass, for the soil is very poor. Throughout much of the grassland are scattered clumps of surviving trees like those among which the tent is pitched to afford shelter from the strong winds that nightly sweep across the plateau from the lake. In the marshy bottoms scraggy woodland straggles besides the streamlets. Hills and rising ground generally are eroded, their gravel-strewn slopes almost entirely devoid of vegetation.

OUR CAMP ON THE NYIKA PLATEAU AT 7500 FEET

The Nyika Plateau, though covering 900 square miles, is practically uninhabited, owing to the not infrequent nocturnal frosts during the coldest months when temperature drops below 40° by day. Africans also fear the sudden descent of mists which blanket these uplands, blotting out all landmarks, until swept away by strong east winds off the lake. The meagre herpetofauna is of the alpine meadow type, resembling that found in the Uzungwe Mountains of southwestern Tanganyika Territory but often subspecifically differentiated so that we found six undescribed forms of reptiles and amphibians.

Photos by Mary V. Loveridge.

PLATE 5

PLATE 6

FORT JOHNSTON on the SHIRE RIVER just below where it emerges from LAKE NYASA. This is Africa's third largest lake, having an area of 11,000 square miles and a depth of about 2316 feet. Collections of fish and reptiles made in the vicinity of Fort Johnston by Alexander Whyte, were sent by him to Mr. (later Sir) H. H. Johnston at Zomba for transmission to the British Museum, where they formed the subject of a report by Dr. Albert Günther (cf. Proc. Zool. Soc. London for 1893, p. 618, footnote). Unfortunately, in the British Museum Catalogue the reptiles collected by Whyte are attributed to Zomba, whereas it is clear from the list on pages 618–619 that most of them (e.g. *Cycloderma frenatum; Pelusios sinuatus*, etc.) must have come from the Lake. Mtimbuka, where Loveridge spent a month, is on the western shore of the Lake about 13 miles north of Fort Johnston.

Photo courtesy of Dr. Mary Light.

PLATE 6

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